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DISSECTION METHODS AND GUIDES

BY

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Figure 1 displays a 10x10 grid of 100 small plots, each showing the distribution of 1000 simulated data points. The plots are arranged in a 10x10 grid. The top row shows a single point at the center. The second row shows a small cluster of points. The third row shows a larger cluster of points. The fourth row shows a very dense cluster of points. The fifth row shows a very dense cluster of points. The sixth row shows a very dense cluster of points. The seventh row shows a very dense cluster of points. The eighth row shows a very dense cluster of points. The ninth row shows a very dense cluster of points. The bottom row shows a very dense cluster of points.

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TO

J. Ryland Whitaker, B. A., M. B. (London)

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, EDINBURGH

LECTURER ON ANATOMY, SURGEON'S HALL, EDINBURGH

This small Manual
is affectionately and respectfully

Dedicated

by one of his former Pupils, the Author

6051

INTRODUCTION

THIS book is intended to bridge the gap that exists between the descriptive text-book and the dissecting table. It is designed for use in conjunction with a text-book, but it is not to supplant it in any way. In order that it may be used in connection with any text-book or atlas, both the old and the new anatomical names have been given. If the instructions seem to be too minute, it should be remembered that the student's first effort may happen to be that very dissection; therefore nothing has been left to chance. Everything that a student could reasonably be expected to do in any well-equipped dissecting room has been carefully explained. Some of the dissections are original, and all of them have been carefully selected with a view to their being well within the capacity of the average student to perform.

The real ability of a practising physician or surgeon must often depend on a true knowledge of human anatomy.

Anatomy that has merely been memorized can only be of service in passing examinations. Such anatomy is speedily forgotten, and can never be of any real value.

To be of real service, anatomy must be remembered not only by the mind, but also by the eye and the hand. Therefore the eye, hand, and mind should simultaneously be trained in the recognition of the appearance, shape, texture, relative size, relative position, and the other peculiarities of the many various structures of the human body. Some of this can be learned at bedside and operating table, but it all should have been thoroughly learned long before that, and it can be thoroughly learned only in the dissecting room. The great majority of students find in the dissecting room their only opportunity of gaining that mastery of anatomy which will make it their servant in after life; therefore it cannot be too strongly urged that the entire body be dissected conscientiously and thoroughly.

Whatever else the student may gain, the main object in doing a dissection is to so prepare a region that its component structures may be studied to advantage. It is the dissection, rather than the book, that should be studied.

Mutilation teaches nothing and ruins a region for subsequent study, while a dissection in which the structures have been carefully cleaned and preserved may be of vast service.

A dissection, therefore, should be in the best possible condition for study. The student may never have another such opportunity. It is not reasonable to

expect a tyro to show the judgment of an expert in planning a dissection, and the unguided effort may be disastrous. Surely it is safer not to leave too much to chance, and, still better, to make sure that the student will have a good, clean dissection. This book has been written in the hope that it may help and encourage the student in the making of good, clean dissections which will show all of the important structures without ruining the part for subsequent work.

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4609 SPRUCE ST., PHILADELPHIA, PA.,

November, 1914.

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DISSECTION METHODS AND GUIDES

CONCERNING EQUIPMENT

ALTHOUGH every well-equipped anatomical laboratory supplies its students with much of the requisite paraphernalia, there are still some things which the student should personally possess. It is very difficult to do good work without an adequate equipment. The small toy-like instruments to be found in the average "pocket dissecting case" are, almost all of them, valueless for dissecting purposes. They are seldom of the right size or shape, and they usually are miserably constructed from the very cheapest and poorest quality of material. The student had better not waste any money on the usual run of pocket cases. Anyway, a pocket is no place for a dissecting room outfit.

The student should have at least the following articles:

One spool of strong white linen thread.

Several curved needles, both large and small.

One dozen bead-headed steel pins, or "Moore push pins."

One Maw's dissector, or a strong bent "blunt probe," such as is used by dentists for plastic filling.

One pair of rat-toothed tissue forceps.

Two pairs of dissecting forceps. Forceps should be about 6 inches long and have a very "soft" spring.

One pair of blunt-pointed curved scissors. The scissors should be at least 6 inches long, both blades should be abruptly blunt, "curved on the flat," and have a screw lock.

One set of chain hooks, which should be very sharp pointed.

One small bladed scalpel.

Two large bladed scalpels.

Scalpels should have large flat handles. The "English model" of blade is by far the most convenient, the "French model" is next best. All of these should be of the very finest quality that can be had, anything less will, in the long run, prove very disappointing.

METHODS OF DISSECTING

The Skin.—It is always desirable that skin-flaps be kept as large as possible, so that they can be used in covering up a dissection to keep it from drying out.

Never make any skin incision when it can be avoided, especially a transverse incision.

Fat.—As a general rule the superficial fat should not be removed along with the skin. Any important structures embedded in the fat should be isolated and lifted up out of the way of injury before attempting to remove the fat. All fat should be thoroughly removed as soon as there is no danger of injuring important structures. One of the most satisfactory ways

of speedily removing fat is to trim it away with the convex side of a pair of curved scissors.

Areolar Tissue.—All loose areolar tissue should be promptly removed. When it covers in some important structure and happens to be dense, it should be picked up between two pairs of forceps and torn apart.

The student should hasten to acquire this method of “dissecting between two forceps” because it is a very rapid as well as a safe way of working. The areolar tissue is often condensed into a sort of sheath for blood-vessels and nerves passing through it. In all cases the important structures should be traced out and freed before any attempt is made to remove the areolar tissue and fat by which they may be surrounded. As soon as you have made sure that the important vessels and nerves are safe from injury, remove all areolar tissue and fat.

Never allow it to remain over night, because if it should become dry its removal becomes very tedious, if not impossible.

Muscles.—Never use great force in moving the arms or legs of a body, nor in forcing the body itself into any unusual attitude, especially if it is very rigid or frozen, because in these conditions the muscles are almost sure to be badly torn. It is far better to divide an unyielding muscle than to tear it in two. But no muscle should ever be divided at any other time unless it is one that cannot be retracted out of the way. All muscles should be freed, as much as possible, from adjoining structures. The best way of freeing muscles from each other is to use a finger.

All loose areolar tissue and fat should be removed from between muscles as soon as it can be done without danger of injuring important vessels and nerves. When the sheath of a muscle is very dense and thick it should be entirely removed. An easy way of doing this is to snip it free with the blunt points of your scissors, working always in the direction of the muscle-fibers.

If the intervals between muscles are indistinct or indistinguishable on account of the density of the overlying fascia, as in the front of the leg, then commence by separating their tendons and working back to the muscles themselves.

Arteries.—All important arteries should be thoroughly cleaned and all *venæ comites* should be removed. The sheaths of large arteries should always be removed with blunt-pointed scissors, never with a knife. In cleaning a large artery, rip the sheath lengthwise for a short distance, seize it between two pairs of forceps, and tear it open along the line of the artery. When it is too tough to tear readily, snip it with blunt-pointed scissors. In this way it is always easy to see branches long before they are in danger of division. When you encounter a branch, divide the main sheath transversely at the base of the branch, then trim it around the branch.

The sheath of a small artery is easily removed by ripping it along the line of the vessel with a dentist's blunt-pointed bent probe, or by tearing it between two forceps; only an occasional snip with scissors will be necessary. As soon as it can be done without danger to adjacent vessels or nerves, the sheath of a

vessel should always be removed. It should never be given an opportunity to roll itself up into a pseudo-nerve. The same injunction applies to all long strands of fascia.

Veins.—These are to be cleaned in exactly the same way as arteries, except that they require more care on account of their being thin-walled and easily torn. Only the larger veins need be saved; the smaller ones would interfere too much with subsequent dissection, so they must be sacrificed. It is always best to tie a vein before cutting it away, otherwise it is almost sure to cause much annoyance by leaking. If a large vein be torn laterally, tie it both above and below the tear.

Nerves.—These should be cleaned with the same scrupulous care that is bestowed on blood-vessels. However, they are never so closely invested and are much easier to clean. Whenever any important vessel or nerve has been accidentally divided, always tie it together again before you have time to forget about it.

Always keep your dissection and its surroundings as scrupulously clean as possible; it will tend to make your work pleasant as well as interesting. Always have at hand a good atlas or text-book. Lastly, remember that all of these directions and instructions are vastly more grievous to read than they are to fulfil.

HEAD AND NECK

ORDER OF DISSECTIONS

1. Back part of the Scalp.
2. Back of the Neck.
3. Suboccipital Triangle.
4. Front part of Scalp.
5. Posterior Triangle of the Neck, superficial dissection.
6. Posterior Triangle of the Neck, deep dissection.
7. Anterior Triangle, superficial dissection.
8. Subclavian Triangle.
9. Carotid Triangles, deep dissection.
10. Anterior Triangle, deep dissection of Upper Part.
11. Face.
12. Removal of Calva and Brain.
13. Orbit from above.
14. Orbit from the outer side.
15. Sphenopalatine Fossa.
16. Pharynx.
17. Transverse section of Skull and Prevertebral Region.
18. Soft Palate.
19. Sagittal section of Skull. Nasopharynx.
20. Tongue.
21. Larynx.

BACK PART OF THE SCALP

From a point slightly above one ear, make an incision across the top of the head to the corresponding point above the other ear. From the middle of this

FIG. 1.—BACK OF HEAD AND NECK.

Knife incisions are shown by continuous red lines. Dotted red lines show where the skin is to be cut with scissors.

incision, make another incision down the midline of the back of the head and neck, as far down as the spine of the first thoracic vertebra. Begin at the very top and reflect the skin downwards until you reach the level of the ear, then begin in the midline incision and reflect the skin forwards and outwards as far as the line joining the lobe of the ear to the point of the acromion process. Just back of the ear, look for the Posterior Auricular Artery (*a. auricularis posterior*) and Posterior Auricular Vein (*v. auricularis posterior*). Pick up these vessels and clean them from below upwards. Just back of the mastoid process you will find the Small Occipital Nerve (*n. occipitalis minor*) and the Occipital Artery (*a. occipitalis*) emerging from the deep fascia, just back of the Sternomastoid Muscle (*m. sternocleidomastoideus*). The nerve lies nearer the posterior edge of the Sternomastoid (*m. sternocleidomastoideus*) than does the artery, and as it is superficial to the artery it should be cleaned first, working from below upwards.

The Occipital Artery (*a. occipitalis*) lies somewhat posterior to the Small Occipital Nerve (*n. occipitalis minor*) and it is more deeply embedded. Follow the Occipital Artery (*a. occipitalis*) backwards until you encounter the Great Occipital Nerve (*n. occipitalis major*) and Occipital Vein (*v. occipitalis*) where they cross it. The Occipital Vein (*v. occipitalis*) pierces the deep fascia just external to the occipital attachment of the Trapezius Muscle. Clean the Occipital Vein (*v. occipitalis*), working from below upwards.

The Great Occipital Nerve (*n. occipitalis major*) pierces the outer edge of the Trapezius Muscle close

to its occipital attachment, and can readily be found by lifting up the outer edge of the Trapezius and exposing it as it emerges from the Complexus Muscle (*m. semispinalis capitis*), just before piercing the Trapezius. Clean the Great Occipital Nerve (*n. occipitalis major*), working from below upwards. Both the Occipital Vein (*v. occipitalis*) and the Great Occipital Nerve (*n. occipitalis major*) are superficial to the Occipital Artery (*a. occipitalis*) and should serve as a guide to it. Clean the superficial portion of the Occipital Artery (*a. occipitalis*), working from below upwards. All the foregoing vessels and nerves being well cleaned, it will now be possible to lift them up or to retract them, so as to permit a speedy and complete removal of all of the fat overlying the posterior belly of the Occipitofrontalis Muscle (*m. epicranius*). The Occipitalis Muscle (*m. epicranius*) should be cleaned by removal of all the overlying fat, which can most easily be done by using a pair of scissors "curved on the flat."

SUPERFICIAL DISSECTION OF THE BACK OF THE NECK

Thoroughly clean the cervical portion of both Trapezii Muscles, working from above downwards and outwards. Be especially careful not to tear or injure the thin, free, antero-external borders of these muscles. The *Right* Trapezius should now be divided transversely along its attachment to the acromion process and spine of the scapula, but do not divide its clavicular attachment. Retain its occipital attachment, but divide its vertebral attachment about 1 inch from the midline. In doing this be careful not to cut the muscles which are attached to the vertebral border of the

scapula. It will be well to use scissors in severing the vertebral attachment of the Trapezius. Do so gradually while freeing the Trapezius, with your fingers, from the underlying muscles, always in advance of your scissors. Reflect the Right Trapezius outwards.

The *Left* Trapezius should now be divided transversely, as was the right, but its clavicular attachment is to be severed as well.

It should be reflected backwards toward the mid-line, but it should not be detached from the vertebræ or occiput. Clean the Splenius Capitis Muscle on each side. Clean the easily accessible portion of the Princeps Cervicis (*ramus descendens*) branch of the Occipital Artery (*a. occipitalis*). Be careful not to cut the Lesser Occipital Nerve (*n. occipitalis minor*) lying close to the posterior border of the Sternomastoid Muscle (*m. sternocleidomastoideus*). It should not be molested at this stage. Clean the entire Levator Anguli Scapulæ (*m. levator scapulæ*) and then the upper part of the Complexus Muscle (*m. semispinalis capitis*).

SUBOCCIPITAL TRIANGLE

On the Left side only, remove entirely the Splenius Capitis Muscle, divide the Levator Anguli Scapulæ (*m. levator scapulæ*), reflect the lower half downwards, and entirely remove the upper half. Now remove the Complexus (*m. semispinalis capitis*) and thoroughly clean the Tracheolomastoid Muscle (*m. longissimus capitis*).

Locate the spinous process of the Axis (second cervical vertebra), then with scissors, "curved on the flat," remove all the overlying fat. You should now readily

locate the transverse process of the Atlas (first cervical vertebra). Now clean the following muscles in exactly the following order:

First, the Superior Oblique (*m. obliquus capitis superior*); second, the Inferior Oblique (*m. obliquus capitis inferior*); third, the Rectus Capitis Posticus Major (*m. rectus capitis posterior major*); fourth, the Rectus Capitis Posticus Minor (*m. rectus capitis posterior minor*).

You should be able to find the Vertebral Artery (*a. vertebralis*) in the triangular interval formed by the Superior Oblique (*m. obliquus capitis superior*) above, the Inferior Oblique (*m. obliquus capitis inferior*) below, and the outer edge of the Rectus Capitis Posticus Major (*m. rectus capitis posterior major*). It will be necessary to defer dissecting the prevertebral muscles of the head and neck until after the pharynx has been dissected.

FRONT PART OF SCALP

Make a longitudinal incision in the midline, beginning at the vertex of the skull and ending at the root of the Nose (or Nasion, in the middle of the naso-frontal groove). Reflect the skin downwards as far as the level of the eyebrow. Do not attempt to remove any of the underlying fat with the skin.

Veins of the Scalp.—In front near the midline, look for and trace out the Frontal Vein (*v. frontalis*). Be careful at its lower part, not to sever its communication with the Ophthalmic Vein (*v. ophthalmica superior*) at the inner canthus of the eye. Just above this point, look for and trace out the Supra-orbital Vein (*v. supra-*

orbitalis) running out horizontally just above the orbit. Just back of the outer canthus, look for the Anterior Temporal Vein (*ramus anterior v. temporalis superficialis*). Trace it out, and in its lower part it will be found to join with the Posterior Temporal Vein (*ramus posterior v. temporalis superficialis*).

Clean the exposed upper portion of the Orbicularis Palpebrarum Muscle (*m. orbicularis oculi*), locate the supra-orbital notch, a little to the inner side of the middle of the arch of the orbit; just above the supra-orbital notch, you will find the Supra-orbital Artery (*a. supraorbitalis*) and Nerve (*n. supraorbitalis*) emerging from under the upper edge of the Orbicularis Muscle (*m. orbicularis oculi*). Trace both, and then clean the Frontalis portion of the Occipitofrontalis Muscle (*m. epicranius*). In front of the ear, find and trace out the Auriculotemporal Nerve. Pack tightly the nasopharynx, mouth, and cheeks, then sew the lips together.

POSTERIOR TRIANGLE OF THE NECK

Superficial Dissection.—Locate a point on the lower border of the lower jaw, halfway between angle and the symphysis. Make a skin incision from this point down to the middle of the clavicle. This incision will expose the Platysma Myoides Muscle (*m. platysma*) where it is most likely to be thick and easy to recognize. Do not make any knife incisions either along the border of the jaw or along the clavicle, but as you dissect the skin up to the border of the jaw cut it along the line of the jaw with a pair of scissors, and in the same way sever it as you progress along the line of the clavicle. Above, this will

FIG. 2.—SCALP, FACE, AND THE TRIANGLES OF THE NECK.
Knife incisions are indicated by continuous red lines. Dotted red lines indicate where the skin should be cut with scissors.

obviate the danger of cutting the *Platysma Myoides* (*platysma*) and the Facial Artery; and below, it will avoid injury to the *Platysma Myoides* Muscle (*m. platysma*), the Suprasternal and the Supraclavicular Nerves. Do not at this time dissect up the skin in front of the Sternomastoid Muscle (*m. sternocleidomastoideus*). Beginning in this incision, reflect the skin outwards and backwards. In the lower part of the incision reflect as much of the skin forwards toward the midline as is necessary to fully expose the Sternomastoid Muscle (*m. sternocleidomastoideus*), but do not remove the skin from the front of the neck. Thoroughly clean the exposed portion of the *Platysma Myoides* (*platysma*); then with a pair of scissors sever it about 1 inch above the clavicle; reflect it forwards and upwards. Clean the External Jugular Vein (*v. jugularis externa*) as far as the angle of the mandible. Be careful not to injure the Superficial Cervical Nerve (*n. cutaneus colli*). The External Jugular Vein (*v. jugularis externa*) crosses this nerve at right angles just about the middle of the Sternomastoid Muscle (*m. sternocleidomastoideus*). Tie the External Jugular Vein (*v. jugularis externa*) below and then sever it above the ligature, and reflect it upwards, but leave it attached above. Clean the Superficial Cervical Nerve (*n. cutaneus colli*), working forwards. Near its origin, at the posterior border of the Sternomastoid (*sternocleidomastoideus*), you should find and trace out the Great Auricular Nerve (*n. auricularis magnus*), which you will find running upwards on the surface of the Sternomastoid (*sternocleidomastoideus*). At the origin of the nerves just mentioned, you will find the Spinal Accessory Nerve ✓

(*n. accessorius*), running downwards and backwards; clean this part of it, then clean the Small Occipital Nerve (*n. occipitalis minor*), which you will find just behind the Great Auricular Nerve (*n. auricularis magnus*) and running, parallel to it, close to the posterior border of the Sternomastoid Muscle (*m. sternocleidomastoideus*). Clean the Sternomastoid Muscle (*m. sternocleidomastoideus*), but do not divide it. Now, if it has not already been done, find the anterior border of the Trapezius Muscle and thoroughly clean both its superficial and deep surfaces, taking care not to sever the Spinal Accessory Nerve (*n. accessorius*).

POSTERIOR TRIANGLE OF THE NECK

Deep Dissection.—Thoroughly clean the Sternomastoid (*sternocleidomastoideus*) for its entire length, but do not divide it. After the thorax has been opened it will be possible to lift the muscle up, together with its sternoclavicular attachment. In order to permit free lateral retraction it will be necessary to divide the Sternomastoid Branch of the Superior Thyroid Artery (*a. thyreoidea superior*). A little above the level of the clavicle you will find running outwards the Transverse Cervical (*v. transversa colli*) and Suprascapular (*v. transversa scapulæ*) Branches of the External Jugular Vein (*v. jugularis externa*). These should be traced out, then tied off, and removed. Now identify the Scalenus Anticus (*m. scalenus anterior*) and the Scalenus Medius (*m. scalenus medius*) Muscles, the cords of the Cervical (*plexus cervicalis*) and Brachial (*plexus brachialis*) Plexuses emerge between them. On the front of the lower end of the Scalenus Anticus, you

will encounter two arteries running transversely outwards. The larger and upper one is the Transverse ✓ Cervical Artery, also called the Transversalis (*transversa*) Colli; the smaller and lower one is the Suprascapular Artery, which is also called the Transversalis Humeri (*a. transversa scapulæ*). Working outwards, trace and clean both of these arteries. Running downwards and inwards, obliquely crossing the front of the Scalenus Anticus Muscle (*m. scalenus anterior*), you will find the Phrenic Nerve (*n. phrenicus*). Clean this portion of it, working upwards. Clean the Subclavian Vein (*v. subclavia*), beginning at the outer border of the first rib and working outwards. In the same way clean the corresponding portion of the Subclavian Artery (*a. subclavia*). Do not at this time interfere in any way with the inner portions of these two vessels. Now clean the primary cords of the Brachial Plexus (*plexus brachialis*).

ANTERIOR TRIANGLE OF THE NECK, LOWER PART

Finish the removal of the skin on the front of the neck by dissecting it upwards to the border of the jaw. In the same way reflect upwards the Platysma Myoides. The Sternomastoid should already have been thoroughly cleaned to allow of its being freely retracted outwards, in order to expose the Descendens Hypoglossi Nerve (*ramus descendens n. hypoglossi*) lying on the front of the sheath of the great vessels. It will be found emerging from behind the Internal Jugular Vein (*v. jugularis interna*) or from behind the Superior Thyroid Vein (*v. thyroidea superioris*), usually, in either case, just on a level with the Cricothyroid Mem-

brane (*membrana cricothyreoidea vel conus elasticus*). Clean it and the Ansa Hypoglossi, which is formed by the continuity or union of the Descendens Hypoglossi (*n. descendens cervicis*) with the Communicantes Hypoglossi. Occasionally the Descendens Hypoglossi, instead of running down on the front of the sheath of the great vessels, is found within the sheath. The Loop of the Ansa may be at any level between the lower border of the Occipital Artery and the posterior belly of the Omohyoid Muscle (*m. omohyoideus*). Should you have any trouble in locating these nerves, just remember that the anterior belly of the Omohyoid (*m. omohyoideus*) is supplied by the Descendens Hypoglossi, and that the posterior belly of the Omohyoid (*m. omohyoideus*) is supplied by the Ansa. So, by carefully cleaning this muscle, it is easy to find the nerves supplying it and to trace them to their origin. Again, it should be remembered that the Ansa is derived by two roots, one from the Second and one from the Third Cervical Nerves, in front of, but in exactly the same way as are both the Great Auricular (*n. auricularis magnus*) and the Superficial Cervical (*n. cutaneus colli*) Nerves. Therefore, it should prove an easy matter to trace the Ansa down from its origin.

Now, begin in the midline and clean, in the following order, first, the Sternohyoid (*m. sternohyoideus*); second, the Omohyoid (*m. omohyoideus*); third, the Thyrohyoid (*m. thyreo-hyoideus*) Muscles. Then remove all of the loose areolar fat lying beneath these muscles. Clean the Thyroid Gland (*glandula thyreoidea*), and clear away all the loose fatty tissue lying below it and on the front of the trachea, and in doing

so be careful not to injure the thyroid vessels, especially the Inferior Thyroid Veins (*vv. thyreoideæ inferiores*). Clean the Stylohyoid Muscle (*m. stylohyoideus*), then the posterior belly of the Digastric (*m. digastricus*), but do not disturb anything in the digastric triangle. Locate the External Laryngeal Nerve (*ramus externus n. laryngeus superior*); you will find it behind the upper part of the Sternothyroid Muscle (*m. sternothyreoideus*) just behind the oblique ridge on the wing of the thyroid cartilage. By tracing this nerve backwards you will encounter the Superior Laryngeal Nerve (*n. laryngeus superior*), which should now be cleaned.

Clean the Internal Jugular Vein (*v. jugularis interna*), ligate and cut away any small veins which interfere. Clean the Common Carotid Artery (*a. carotis communis*). Look in the thorax for the Phrenic Nerve (*n. phrenicus*) and follow it up into the neck. In the same way follow up and clean the Pneumogastric Nerve (*n. vagus*). Follow up the Thoracic Duct (*ductus thoracicus*) from within the chest and clean the Left Subclavian Vein (*v. subclavia*).

SUBCLAVIAN TRIANGLE

Clean the right Subclavian Vein (*v. subclavia*), and in doing so be careful not to injure the Right Lymphatic Duct (*ductus lymphaticus dexter*), which you will find entering the Subclavian Vein (*v. subclavia*) from above, just external to the union with the Internal Jugular Vein (*v. jugularis interna*). From within the chest, trace upwards the Recurrent Laryngeal Nerves (*nn. laryngei inferiores*). Clean the Subclavian Artery

(*a. subclavia*), the Thyroid Axis (*truncus thyrocervicalis*), and its branches.

In cleaning the Inferior Thyroid Artery (*a. thyroidea inferior*), be on the lookout for the Gangliated Cord (*truncus sympatheticus*) of the Sympathetic, which you will often find crossing it in front. Clean the Gangliated Cord (*truncus sympatheticus*) and its Middle Cervical Ganglion (*ganglion cervicale medium*); trace it upwards first, then follow it downwards into the chest.

ANTERIOR TRIANGLE OF THE NECK, UPPER PART

Before working out this region, it will be necessary to find the Facial Nerve (*n. facialis*) and free it, so that it can be freely lifted up or retracted; otherwise it is almost sure to be destroyed. To find the main trunk of the Facial Nerve (*n. facialis*), first locate the transverse process of the Atlas, then in front of this feel for the styloid process. You should find the Facial Nerve (*n. facialis*) crossing the base of the styloid process on its outer side. This nerve stands out far more than it is shown to do in most plates. If the subject happens to be very fat, or to have a thick, short neck, it may prove easier to find the Facial Nerve (*n. facialis*) in another way. This second manner of finding the Facial Nerve (*n. facialis*) will be more intelligible if you understand the following points: At just about the level of the angle of the mandible the External Jugular Vein (*v. jugularis externa*) is formed by the confluence of two veins. The anterior one of these is the Temporomaxillary Vein (*v. facialis posterior*), the posterior one is the Posterior Auricular (*v. auricularis posterior*). The Temporo-

maxillary Vein (*v. facialis posterior*) originates in the substance of the Parotid Gland (*glandulæ parotis*) by the confluence of two veins. The anterior one of these is the Internal Maxillary Vein (*v. maxillaris interna*), the posterior is the Common Temporal Vein (*v. temporalis communis*). The Internal Maxillary Vein (*v. maxillaris interna*) is much the larger and is the most important one in this dissection. Note that it is always the anterior branch of any two of the aforementioned veins which is important to us at this time.

In the substance of the Parotid Gland (*glandulæ parotis*), the Facial Nerve (*n. facialis*), by dividing up, forms what is called the Pes Anserinus. Of these divisions the largest two are: First, the Temporofacial, which runs upwards and forwards; second, the Cervicofacial, which runs forwards and downwards. For this dissection it is important to note two things: First, that the Internal Maxillary Vein (*v. maxillaris interna*) is superficial to and crosses the Cervicofacial Division; second, that the Cervicofacial is superficial to and crosses the Common Temporal Vein (*v. temporalis communis*). You have only to find the Internal Maxillary Vein (*v. maxillaris interna*) in order to find the Cervicofacial Division of the Facial Nerve. Therefore, carefully follow up the External Jugular Vein (*v. jugularis externa*), clearing it *anteriorly* without molesting its posterior branches. In the same way follow up the Temporomaxillary (*v. facialis posterior*), and then the Internal Maxillary (*v. maxillaris interna*), under which you will find the Cervicofacial Nerve, which you should then trace backwards to the main trunk of the Facial (*n. facialis*). Clean the main trunk of the

Facial Nerve (*n. facialis*) and follow out its branches through the Parotid Gland (*glandulæ parotis*) until they emerge from the gland. Make sure that you have this nerve quite free, so that it can be readily retracted. Do not remove any more of the skin from the face than is absolutely necessary to the full exposure of the Parotid Gland. Clean the External Carotid Artery (*a. carotis externa*) and follow out first the Postauricular Artery (*a. auricularis posterior*), and then the Temporal Artery (*a. temporalis superficialis*). Now clean as much as is easily accessible of the Internal Maxillary Artery (*a. maxillaris interna*). Just behind the neck of the mandible, or lying on the capsular ligament, look for the Auriculotemporal (*n. auriculotemporalis*) Branch of the Mandibular Nerve (*n. mandibularis*) and trace it upwards. After all of the afore-mentioned structures have been fully worked out, get rid of all fat and entirely remove the Parotid Gland. Sever the Stylomandibular Ligament (*l. stylo-mandibulare*) and then clean the Styloglossus and Stylopharyngeus Muscles and the Glossopharyngeal Nerve (*n. glossopharyngeus*). The Stylopharyngeus Muscle is supplied by the Glossopharyngeal Nerve (*n. glossopharyngeus*).

Clean the Internal Jugular Vein (*v. jugularis interna*) and the Internal Carotid Artery (*a. carotis interna*). Trace upwards the Superior Laryngeal Nerve (*n. laryngeus superior*) and then clean the Pneumogastric Nerve (*n. vagus*).

Now remove the sheaths of the foregoing structures, then clean, in the following order: First, the Superior Thyroid Artery (*a. thyreoidea superior*); second, the

exposed portion of the Lingual Artery (*a. lingualis*); third, the Ascending Pharyngeal Artery (*a. pharyngea ascendens*); fourth, the Facial Artery (*a. maxillaris externa*) as far only as the border of the mandible. Clean the anterior belly of the Digastric Muscle (*m. digastricus*) and free the Submandibular Gland (*glandula submaxillaris*), so that it can be reflected upwards and forwards. Clean the Mylohyoid Muscle (*m. mylohyoideus*), and in doing so be careful not to injure the Hypoglossal Nerve (*n. hypoglossus*).

THE REGION OF THE FACE

Remove all of the skin from the entire face, but in doing so do not attempt to remove any of the underlying fat. It is good practice not to make any preliminary knife incisions anywhere on the face itself, but when the skin has been dissected up close to any natural opening, such as the mouth, nose, and eye, to then *trim it around the opening with a pair of scissors*. The skin having been removed, but the superficial fat left undisturbed, you should complete the dissection of the Facial Nerve. Then work out the Superficial Temporal Artery (*a. temporalis superficialis*) and carefully follow out its Transverse Facial (*a. transversa faciei*) Branch, which will be found about a finger's breadth below and parallel to the Zygoma. Just below this artery you should find and clean the Parotid (Stenson's) Duct (*ductus parotideus*).

Working from below upwards, clean the facial portion of the Platysma, following its converging fibers to the corner of the mouth. It may be that in this situation the Platysma is far too attenuated and thin to

allow of its being followed to the corner of the mouth, but even then, a fairly well-defined bundle of its uppermost muscular fibers will be found running horizontally outwards and backwards from the corner of the mouth. This bundle of the *Platysma* constitutes what is usually called the *Risorius Muscle*.

Begin at the border of the mandible and follow up the *Facial Artery* (*a. maxillaris externa*); be careful not to cut its *Submental* (*a. submentalis*) Branch, which is usually given off at the border of the jaw. If you do sever it, tie it on again with a piece of thread.

Clean the *Facial Artery* until you reach the point where it dips under the *Risorius*. On the side of the nose, close to the inner canthus of the eye, find and clean the *Angular Artery* (*a. angularis*), working down as far as the edge of the *Zygomaticus Minor Muscle*. Now finish cleaning the *Orbicularis Palpebrarum* (*m. orbicularis oculi*), and then clean, in exactly the following order: First, the *Pyramidalis Nasi* (*m. procerus*); second, the *Levator Labii Superioris Alæque Nasi*; third, the *Levator Labii Superioris* (*proprius*). Next clean the *Zygomaticus Minor*, the *Zygomaticus Major*, and the *Risorius*; after which clean that portion of the *Facial Artery* (*a. maxillaris externa*) underlying them. Clean the *Orbicularis Oris*, then retract the *Risorius* downwards and follow out the *Superior Coronary Artery* (*a. labialis superior*). Retract the *Risorius* upwards and trace out the *Inferior Coronary Artery* (*a. labialis inferior*). Both of these arteries are given off by the *Facial* under cover of the *Risorius*.

Trace out the *Inferior Labial Artery*, and then clean the *Depressor Anguli Oris* (*m. triangularis oris*) and

the Depressor Labii Inferioris (*m. quadratus labii inferioris*). Clean the Masseter Muscle, after which clean the Buccinator Muscle, but be careful not to sever the Parotid Duct, the outer end of which should be secured by a stitch to the fascia of the Masseter Muscle.

Clean the Temporal Muscle (*m. temporalis*) and remove all the fat from behind the arch of the Zygoma, especially in the front part of the arch. Thoroughly clear away and remove all the fat from the entire region of the face. In doing so, use a pair of scissors which are "curved on the flat."

REMOVAL OF THE BRAIN

From the middle of the forehead, make a longitudinal incision in the midline, as far back as the Inion (*protuberantia occipitalis externa*). At right angles to this cut, make a transverse one, running from one ear to the other. Both of these cuts should go through the periosteum. Turn down the four flaps thus formed and fully expose the skull. Saw off the Calva at a level which, in front, should be a finger's breadth above the eye-socket, and behind it should be about the same distance above the Inion (*protuberantia occipitalis externa*). You will find it easier to do this neatly if you first encircle the skull, at the right level, with a piece of string, and then saw a slight groove all the way around before sawing all the way through the bone. When it is imperative that the brain be absolutely uninjured, then it is necessary to avoid sawing all the way through the bone at any point, but to saw as nearly through the bone as can safely be done, and

then to cut or break through the inner table of the skull with an osteotome or sharp flat chisel.

After the Calva has been separated from the skull, lift it up slightly in front, and separate, in its longitudinal midline, the attachment of the Dura Mater. Study the disposition of the Meningeal Arteries and the Pacchionian Bodies (*granulationes arachnoideales*). Slit open the Superior Longitudinal Sinus (*sinus sagittalis superior*) and note the cords of Willis, the Pacchionian Bodies (*granulationes arachnoideales*), and communications with Parasinoidal Spaces. Using a pair of blunt-pointed scissors, cut the dura away from the Superior Longitudinal Sinus (*sinus sagittalis superior*) on both sides; then cut the Dura Mater (*encephali*) transversely downwards on each side, in the same way that the scalp was cut. Remove any sharp points or splinters of bone from the sawn edge of the skull. Turn the triangular flaps of Dura Mater over the margin of the skull to protect your hands from its sharp edges. Gently lift up the frontal lobes and snip off the Falx Cerebri as closely as you can to the Crista Galli. Then divide the filaments of the Olfactory Nerves (*nn. olfactorii*) and, following back, clip the Optic (*n. opticus*), Third (*n. oculomotorius*), and Fourth (*n. trochlearis*) Nerves, the Infundibulum, and the Internal Carotid Arteries (*aa. carotides internæ*). On both sides divide the Tentorium Cerebelli as closely as is possible to the bone. Then divide the Fifth (*n. trigeminus*), Sixth (*n. abducens*), Seventh (*n. facialis*), and Eighth (*n. acusticus*) Nerves. Tilt the head to the opposite side while doing so. After the Tentorium has been divided on both sides, tilt the

head well back, support the brain with your hand, and allow it to turn out backwards far enough to permit of your dividing the remaining cranial nerves and the vertebral arteries; draw slightly on the spinal cord, and (now for the first time using a knife) cut the cord at as low a point as can conveniently be reached. If, after opening the dura, you find that the brain is too soft to permit of its removal, no attempt should be made to remove it intact. Instead, empty out as much of it as will come away by gentle shaking, then thoroughly wash out the rest of it with hot water. This will afford an excellent opportunity to study the cerebral vessels, the Falx, Tentorium, and some of the cranial nerves. The Tentorium should then be trimmed away close to its attachments and the cerebellum washed out, thereby exposing the arteries of the base of the brain and the rest of the cranial nerves. Identify each of the cranial nerves as it pierces the dura, and identify the arteries. Slit open and follow out the Lateral Sinus (*sinus transversus*), the Superior (*s. petrosus superior*) and Inferior (*s. petrosus inferior*) Petrosal Sinuses, but do not disturb the Cavernous Sinus (*s. cavernosus*). Note the frontal air-sinuses and find out if they communicate with each other; as a rule they do not.

ORBIT AND EYE

Saw off the vertical portion of the frontal bone on a level with the cerebral surface of the orbital plates. This saw-cut should extend all the way back to the parietal, in order that the entire frontal portion may be removed. Lift up and remove the dura from both orbital plates as far back as the sphenoidal fissure.

Free the periosteum and the overlying soft parts from the upper and outer margin of the arch of the orbit. Saw through the arch of the orbit in two places, one being just over the inner canthus, and the other over the outer canthus, of the eye. A smart blow with a mallet should readily break away the intervening bone and fracture the orbital plate. The blow should be directed upwards. Carefully separate the soft parts from the roof of the orbit, and with bone-forceps trim away all of the roof as far back as the Lesser Wing (*ala parva*) of the Sphenoid. Saw through the base of the Lesser Wing (*ala parva*) of the Sphenoid, cutting almost into the Optic Foramen. Be careful not to cut the optic nerve, and try to retain the anterior clinoid process intact. Break away the Lesser Wing of the Sphenoid and lay widely open both the Optic Foramen and the Sphenoidal Fissure (*fissura orbitalis superior*).

Carefully clear away all fat from the inner half of exposed portion of the eye. Locate the Superior Oblique Muscle (*obliquus oculi superior*), and on the back part of its upper surface, look for the Fourth Nerve (*n. trochlearis*). Trace this nerve backwards as far as the Tentorium Cerebelli. Do not attempt to seize it with your forceps, for it is soft and easily torn. Instead, you should cut the fascia along each side of it, close to it. Then you can lift it out of its bed with your knife handle. Now go to the outer half of the exposed upper surface of the eye and carefully isolate the Lacrimal Gland (*glandula lacrimalis*). In doing so be careful not to injure the Lacrimal (*n. lacrimalis*) Branch of the Ophthalmic Nerve. Iso-

late this nerve from the loose cellular fat in which it is lying, but do not attempt to trace it backwards. Clear away all of the remaining fat from the upper surface of the eye. On the front of the apex of the petrous bone, expose the Gasserian or Trigeminal Ganglion (*g. semilunare*) by removing the layer of dura which covers it. Trace the Ophthalmic Nerve forwards through the outer wall of the Cavernous Sinus; then follow the Lacrimal Nerve forwards until you reach the part you have already cleaned. Halfway between the anterior and posterior clinoid processes, in a little triangle formed by the attachments of the dura, look for the Third or Oculomotor Nerve (*n. oculomotorius*), and trace it forwards until it divides into its upper and lower divisions. Passing between these divisions you will see the Nasal (*n. nasociliaris*) Branch of the Ophthalmic Nerve. Look for the Sixth or Abducent Nerve (*n. abducens*). You will find it in the floor of the Cavernous Sinus or in the notch on the side of the Dorsum Sellæ; trace it forwards to the interval between the two heads of the External Rectus Muscle. Clean the Levator Palpebræ Superioris Muscle and the Superior Rectus Muscle (*m. rectus oculi superior*). Clean the upper division of the Third Nerve (*n. oculomotorius*), following it out to its terminations in the two muscles just mentioned. Do not molest the lower division of the Third Nerve at this time. Clean the Superior Ophthalmic Vein, the Ophthalmic Artery, and its Supra-orbital Branch. Clean away every remaining atom of fat from this region of the eye. Both eyes should be dissected, up to this point. Keep the left eye in its present state for

later comparisons, and proceed on the right side to do the deep lateral dissection. Using the handle of your knife, carefully separate the soft parts from the outer margin and outer wall of the orbit; then cut through the malar bone into the Sphenomaxillary Fissure (*fissura orbitalis inferior*). Remove the outer wall of the orbit, especially its back part. Bone-forceps will serve you best for this purpose. Clean away all the fat and then divide the External Rectus (*m. rectus oculi externus*) close to the eyeball, and reflect it backwards. Now clean the lower division of the Third Nerve (*n. oculomotorius*) at its back part; look for a short, thick branch running upwards; this goes to the Ciliary Ganglion (*g. ciliare*) and will serve as a guide to it. Clean the Optic Nerve and finish cleaning the Ophthalmic Artery and the Ophthalmic Vein.

SPHENOPALATINE FOSSA (*f. pterygopalatina*) **AND INTERNAL MAXILLARY ARTERY** (*a. maxillaris interna*)

After having completed the deep lateral dissection of the right orbit, proceed, on the same side, to detach the soft parts from the facial surface of the malar bone and the zygomatic arch. Saw through the Zygomatic Process immediately in front of the temporomandibular articulation.

Saw the malar away from the maxilla in such a way that the Maxillary Antrum (*sinus maxillaris*) will be opened. It is not necessary to saw entirely through, as it is more convenient to pry or wrench the malar loose after sawing far enough, so that it is mostly held in place by the orbital plate of the maxilla. The malar and zygomatic arch having been removed,

remove the fat and clean the Temporal Muscle, then saw off the coronoid process and reflect the Temporal Muscle upwards, fastening it up out of your way by a stitch. Open the temporomandibular joint, and with a pair of blunt-pointed scissors trim away all of the outer part of the capsule in order to show the two joint cavities, the interarticular fibrocartilage, and the attachment to that cartilage of the upper head of the External Pterygoid Muscle. Saw the ramus of the jaw horizontally about one-third of the distance down from the condyle to the angle. It is better not to saw entirely through the ramus, but to complete the saw-cut by fracturing the bone. You must keep well above the middle of the ramus to avoid injuring the Inferior Dental Nerve. Sever the insertion of the External Pterygoid in front of the neck, then detach the capsule, disarticulate, and remove the bone. Using a pair of blunt-pointed scissors, remove all of the capsule and the interarticular cartilage. Be careful in doing so, not to injure the mandibular division of the Fifth Nerve or the Chorda Tympani Nerve, which are close behind and internal to the capsule. It often happens that the Internal Maxillary Artery lies under cover of the External Pterygoid Muscle, in which case that muscle should be shredded away piecemeal and entirely removed, and with it all fat. If the artery is superficial to the lower head of the External Pterygoid, then clean the artery before removing the muscle. The artery must be cleaned and the muscle must be removed; the order in which you do so must depend upon their disposition. Remove all of the outer wall of the Maxillary Antrum (*sinus*

maxillaris), then as much of the roof as is external to the infra-orbital canal. Break up and remove all of the posterior wall. The Sphenopalatine Fossa (*f. pterygopalatina*) is now widely open, so that everything in this region is easily accessible. Using two pairs of dissecting forceps, clear away all fat. Finish cleaning the internal maxillary artery and isolate its branches. Isolate the Sphenopalatine (Meckel's) Ganglion, Maxillary (*n. maxillaris*) Division of the Fifth (*n. trigeminus*), and the Infra-orbital Nerves. Now clean the Mandibular Division of the Fifth (*n. trigeminus*), internal to it as it emerges from the foramen ovale; find the Otic Ganglion. Clean the Lingual Nerve and the Chorda Tympani. Clean the Sphenomandibular Ligament.

PHARYNX

Clean the left Buccinator Muscle. Remove the zygomatic arch and with it the Masseter and both Zygomatic Muscles. Saw vertically through the mandible just back of the attachment of the Buccinator Muscle, then saw off the coronoid process. Disarticulate and remove the ramus of the mandible. Entirely remove both the External and the Internal Pterygoid Muscles. In removing the latter be careful not to destroy the Tensor Palati (*m. tensor veli palatini*). Remove the Sternomastoid Muscle (*m. sternocleidomastoideus*), sever the posterior belly of the Digastric Muscle close to its osseous attachment, and reflect it downwards and forwards. Clean the Stylopharyngeus and Styloglossus Muscles, then clean the Tensor Palati (*m. tensor veli palatini*) as far as the hamular process. Clean the Inferior Constrictor, then

the Middle Constrictor. Finish cleaning the Buccinator, carefully working out its junction with the Superior Constrictor (*m. constrictor pharyngis superior*), which forms the Pterygomandibular Ligament. Clean the Superior Constrictor and free its upper border from the Pharyngeal Aponeurosis which there forms the Sinus of Morgagni. In doing so be careful not to cut the Levator Palati (*m. levator veli palatini*). Sever both Styloid Processes and reflect them forwards, along with the muscles attached to them. Thrust your fingers into the interval between the esophagus and the Left Longus Colli Muscle. Tear through the loose areolar tissue and enlarge the space until you are able to thrust your hand through to the other side. Keep enlarging this space upwards, separating the pharynx from the vertebræ and prevertebral muscles until you reach the basilar process. Detach the common central tendon of the pharyngeal constrictors from the Pharyngeal Spine (*tuberculum pharyngeum*). With your hand retract forwards all of the soft parts, insert a saw and cut transversely upwards through the base of the skull. This saw-cut should be immediately anterior to the attachment, on each side, of the Rectus Capitis Anticus Major (*m. longus capitis*) to the basilar process. All the soft parts anterior to these muscles should be retracted well forwards and be protected from the saw. For this latter purpose it is convenient to use as a retractor a strip of cloth or a piece of bandage. In order the sooner to abandon the spinal column to those who may be working out the spinal cord, it is now a convenient time to work out the prevertebral region. So cut off

the esophagus and trachea just above the level of the bifurcation of the latter, and lay aside the larynx, nasopharynx, etc., to be finished later.

PREVERTEBRAL REGION

Remove the prevertebral fascia, and, on both sides, clean in the following order: First, the Rectus Capitis Anticus Major (*m. longus capitis*); second, the lower half of the Longus Colli; third, the Scalenus Anticus (*m. scalenus anterior*). On one side remove the Rectus Capitis Major (*m. longus capitis*) and Anterior Scalene (*m. scalenus anterior*). Clean the Cervical Nerves and as much as is easily accessible of the Vertebral Artery (*a. vertebralis*). Clean: First, the Scalenus Medius; second, the upper half of the Longus Colli; third, the Rectus Capitis Anticus Minor (*m. rectus capitis anterior*); fourth, the Rectus Capitis Lateralis. Retract forwards the Middle Scalene (*m. scalenus medius*) and clean the Scalenus Posticus (*m. scalenus posterior*). Look for the Deep Cervical Branch of the Superior Intercostal Artery lying on the Semispinalis Colli Muscle (*m. semispinalis cervicis*). In order to fully expose the Vertebral Artery it would be necessary to clip through the costal processes and then break away the transverse processes of the cervical vertebræ, and if desired, this can now be done.

SOFT PALATE

Open the pharynx posteriorly in the midline, remove all the packing, and thoroughly cleanse its internal surface. In opening the pharynx from behind, be on the watch for a pharyngeal tonsil, especially if the sub-

ject happens to be young. Make traction on the Uvula in order to tense the Levator Palati (*m. levator veli palatini*). Remove the mucous membrane and glandular tissue from the lower part of this muscle, and expose the Azygos Uvulæ (*m. uvulæ*) and the posterior head of the Palatopharyngéus (*m. pharyngopalatinus*). Strip off the mucous membrane outwards and backwards, clean the Levator Palati (*m. levator veli palatini*), and expose the anterior head of the Palatopharyngeus (*m. pharyngopalatinus*). Explore and then clean the Eustachian Tube (*tuba auditiva*), after which slit it open.

Strip off the mucous membrane outwards and backwards, and clean the Palatopharyngeus (*m. pharyngopalatinus*). Reflect inwards the palatal attachments of the Levator Palati (*m. levator veli palatini*) and the Palatopharyngeus (*m. pharyngopalatinus*), in order to expose the reflected tendon of the Tensor Palati (*m. tensor veli palatini*) running around the Hamular Process (*hamulus pterygoideus*).

Finish the removal of the mucous membrane from the inner surface of the pharynx. Starting at the Palatopharyngeus Muscle (*m. pharyngopalatinus*), strip the mucous membrane forwards to expose the tonsil, which you should find lying in the triangular interval between the Palatopharyngeus (*m. pharyngopalatinus*) Muscle ("posterior pillar") and the Palatoglossus (*m. glossopalatinus*) Muscle ("anterior pillar"). It will be best to defer working out this region until after it has been better exposed by a longitudinal section of the skull.

NASOPHARYNX

Saw through the base of the skull longitudinally immediately to one side of the Crista Galli, continuing the cut down through the maxilla and hard palate. When this has been done, remove the entire septum of the nose, scrape and thoroughly cleanse the fossæ. Finish working out the tonsil and the Palatoglossus (*m. glossopalatinus*). Reflect the Inferior Turbinal (*concha nasalis inferior*) upwards and explore the Nasal Duct (*ductus nasolacrimalis*). Reflect the Middle Turbinal (*concha nasalis media*) upwards and explore the openings of the Infundibulum (*infundibulum ethmoidale*) and Antrum of the Maxilla (*sinus maxillaris*). Locate the openings of the Sphenoidal Sinus (*sinus sphenoidalis*) and Posterior Ethmoidal Cells (*cellulæ ethmoidales*). It will not be necessary to cut away or remove the turbinals, as they are easily broken so that they can be turned up.

TONGUE

Saw through the mandible a little to one side of the middle of the symphysis. On this same side incise the mucous membrane along and just below the outer border of the tongue, from its base nearly to its tip. Dissect this mucous membrane outwards to the mandible. With a pair of scissors sever the Mylohyoid Muscle close to its attachment to the mandible, then sever the anterior belly of the Digastric, and remove the bone. Reflect the Mylohyoid Muscle (*m. mylohyoideus*) downwards. Isolate the Sublingual Gland (*glandula sublingualis*). Clean the deep anterior portion of the Submandibular Gland (*glandula submaxil-*

laris). Be careful not to sever its (Wharton's) Duct (*ductus submaxillaris*). Look for the Lingual or Gustatory Nerve (*n. lingualis*) as it crosses Wharton's Duct (*ductus submaxillaris*). Just about this point look for the anastomotic branch to the Hypoglossal Nerve (*n. hypoglossus*). Just back of this, you should find several small filaments leading down to the Submandibular Ganglion (*ganglion submaxillare*). Clean the upper border of the Lingual Nerve (*n. lingualis*), then clean its lower border very carefully in order not to destroy the filaments from which depends the Submandibular Ganglion (*ganglion submaxillaris*). Isolate this ganglion. Clean the Hypoglossal Nerve (*n. hypoglossus*), being careful not to sever, on its upper border, its communication with the Lingual (*n. lingualis*). Clean Wharton's Duct (*ductus submaxillaris*).

Remove most of the Submandibular Gland (*glandula submaxillaris*). Only a small portion of it should be allowed to remain, attached by its duct. This permits free exposure of the Submandibular Ganglion (*ganglion submaxillaris*). Clean the Hyoglossus Muscle (*m. hyoglossus*), carefully free its borders, and in freeing its posterior border be careful not to sever the Glossopharyngeal Nerve (*n. glossopharyngeus*). Lift up its anterior border and free it from the underlying structures, from top to bottom, then sever it in the middle with a pair of scissors. Reflect the upper half of the Hyoglossus upwards. Running around the lower end of the Stylopharyngeus you will find the Glossopharyngeal Nerve (*n. glossopharyngeus*), which then runs under the upper half of the Hyoglossus Muscle,

and should now be traced out. Reflect the lower half of the Hyoglossus downwards, and work out the Lingual Artery (*a. lingualis*) and its Dorsalis Linguae Branch. Clean the Lingualis Inferior Muscle (*m. longitudinalis linguae inferior*). Its fibers are longitudinal, and you will find it close under the tongue and hidden by the upper part of the Hyoglossus, combined with the interlacing terminal fibers of the Styloglossus (*m. styloglossus*). Clean the Geniohyoglossus Muscle (*m. geniohyoglossus*). Its fibers radiate from the upper genial tubercle of the mandible.

Clean the Geniohyoid Muscle (*m. geniohyoideus*). Its fibers run from the lower genial tubercle to the Hyoid Bone, and are parallel to the lowermost fibers of the Geniohyoglossus.

LARYNX

The following muscles, having all been well worked out in previous dissections, are all to be removed on the left side: First, Digastric (*m. digastricus*); second, Mylohyoid (*m. mylohyoideus*); third, Stylohyoid (*m. stylohyoideus*); fourth, Sternohyoid (*m. sternohyoideus*); fifth, Sternothyroid (*m. sternothyreoideus*); sixth, Omohyoid (*m. omohyoideus*); seventh, Middle Constrictor (*m. constrictor pharyngis medius*); eighth, Stylopharyngeus (*m. stylopharyngeus*).

Those on the right side should be retained as nearly intact as may be possible. Isolate the Superior (*m. laryngeus superior*), External (*ramus externus*), and Recurrent (*n. laryngeus inferior*) Laryngeal Nerves. Clean the Cricothyroideus Muscle, then the Cricothyroid Membrane. Clean the Thyrohyoideus Muscle,

sever it close to its lower attachment, reflect it upwards, and then clean the outer surface of the Thyrohyoid Membrane. Look for Parathyroid Glands in the recess behind the bar of the hyoid bone. Remove the left half of the thyrohyoid membrane. Look in the larynx and note the anterior attachment of the upper (false) Vocal Cords (*plicæ ventriculares*); then sever the thyroid cartilage about $\frac{1}{2}$ inch to the left of their attachment. Reflect the left half of the thyroid cartilage downwards, and, in the following order, work out: First, the Arytenoideus; second, Crico-arytenoideus Posticus; third, Crico-arytenoideus Lateralis; fourth, the two fasciculi of the Thyro-arytenoideus. Remove the pad of fat from behind the Thyrohyoid Membrane and clean the Thyro-epiglottideus Muscle. Trim away the mucous membrane and clean the Aryteno-epiglottideus Muscle.

THORAX AND ABDOMEN

ORDER OF DISSECTIONS

1. Ischiorectal Fossa.
2. Perineum Proper (male).
3. Perineum Proper (female).
4. Thorax and its Contents.
5. Abdominal Wall and Inguinal Hernia.
6. Inguinal and Femoral Hernia from behind.
7. Abdominal Contents.
8. Pelvic Contents in General, and Dismemberment of Right Lower Extremity.
9. Pelvic Viscera (male).
10. Pelvic Viscera (female).
11. Spermatic Cord and Testicle.
12. Penis and Male Urethra.
13. The Muscles of the Back.
14. Spinal Cord.

ISCHIORECTAL FOSSA

Take a 2-yard length of strong, thick twine and tie it in a loop. Securely fasten a plug of tow, oakum, or some such material in one end of this loop. Thrust this plug far into the rectum, allowing the other end of the loop to protrude. Later on you will find that by pulling on this loop you can make structures conveniently superficial which otherwise would be hard to reach. The rectum and vagina should be packed tightly. The anus and vulva should be sewn shut. The body should now be placed on its belly and drawn

across the table, or to the lower end of the table, allowing the legs to hang down. From the tip of the coccyx, make an incision downwards and outwards to a point just over the insertion of the Gluteus Maximus (*m. glutæus maximus*), below the Great Trochanter (*trochanter major*) of the femur. Cut down to the Gluteus Maximus Muscle (*m. glutæus maximus*) and thoroughly clean and expose its postero-inferior border. With a pair of blunt-pointed scissors ("curved on the flat") dissect the skin up to the margin of the anus, trim it around the margin of the anus, dissect it off the perineum, cut it off transversely, and get rid of it. Do not attempt to remove any of the underlying fat while dissecting off the skin.

Lift up the postero-inferior border of the Gluteus Maximus Muscle (*m. glutæus maximus*) and look for the Long (Inferior) Pudendal Nerve (*n. pudendus inferior*). You should find it crossing the tendinous origin of the Biceps Muscle (*m. biceps femoris*), at right angles, about 2 inches below the tuberosity of the ischium. Do not attempt to trace out this nerve until the body is placed in the lithotomy position. Just locate it definitely and remember where it is when you come to the removal of the overlying fat. Carefully clean away the fat from over the External Sphincter Ani Muscle (*m. sphincter ani externus*). Begin at the tip of the coccyx and follow the muscle-fibers forwards around the anus to their insertion in the fibrous central tendon of the perineum. Locate and clean the Great Sacrosciatic Ligament (*l. sacrotuberosum*), but do not sever it. Emerging from underneath this ligament and running toward the anus you will

FIG. 3.—ISCHIORECTAL FOSSA AND PERINEUM.

Continuous red lines indicate knife incisions. Red dotted lines indicate where the skin should be cut with scissors.

find the External (Inferior) Hemorrhoidal (*a. hæmorrhoidalis inferior*) Branch of the Internal Pudic (*a. pudenda interna*) Artery, and with it the Inferior Hemorrhoidal (*n. hæmorrhoidalis inferior*) Branch of the Pudic Nerve (*n. pudendus*). These should be cleaned and freed. In the front part of the ischiorectal fossa look for the External (or Posterior) Superficial Perineal (*n. perinei*) Branch of the Pudic Nerve (*n. pudendus*). Clean it as far as the posterior margin of the Triangular Ligament (*diaphragma urogenitale*). Remove all the fat from the ischiorectal fossa, except from its anterior extension. Clean the Levator Ani Muscle.

PERINEUM PROPER (MALE)

Place the body on its back and secure it in the lithotomy position. Dissect the skin forwards, splitting it in the midline as you progress. Reflect it outwards as far as the genitocrural crease, and cut it away, along the crease. Work out the Long Pudendal Nerve (*n. pudendus inferior*), then entirely remove the superficial thick fatty layer of the superficial fascia in order to expose Colles' Fascia, which is the thin fibrous layer of the superficial fascia. Beginning on each side, close to the ischial tuberosity, detach Colles' Fascia from the outer lip of the lower margin of the ischiopubic ramus, going as far forwards as is convenient. Detach it posteriorly from the transverse perineal margin of the Triangular Ligament (*diaphragma urogenitale*), and reflect it forwards. This opens up the Superficial Perineal Interspace, which, you will note, is the interval between Colles' Fascia and the superficial (inferior) layer of the Triangular Ligament (*fascia diaphragmatis urogenitalis*

inferior). You will find in it the following structures: On each side, the Corpus Cavernosum, surrounded by the Ischiocavernosus (Erector Penis) Muscle. In the midline, the Bulb of the Corpus Spongiosum, surrounded by the Bulbocavernosus (Accelerator Urinæ) Muscle. In the back part, close to the free border of the Triangular Ligament, the Superficial Transversus Perinæi Muscle. Lastly, piercing this muscle or crossing it from behind forwards, you will find the superficial perineal vessels and nerves. Clean all the structures in this space in the order in which they have just been given and remove all of the fat. Detach both crura of the Corpora Cavernosa close to the bone, then divide the urethra close to the surface of the triangular ligament. Reflect forwards the bulb and the Corpora Cavernosa in order to fully expose the surface of the Superficial Layer (*fascia diaphragmatis urogenitalis inferior*) of the Triangular Ligament.

Divide this superficial layer on each side, just internal to and close to the former attachment of the crus of the Corpus Cavernosum. Reflect each half toward the midline. As you progress, sever its attachment to the free margin of the deep layer.

This opens up the Deep Perineal Interspace, which, you will note, is the interval between the Superficial Layer and the Deep Layer (*fascia diaphragmatis urogenitalis superior*) of the Triangular Ligament. In this space, in the midline, look for and clean the Membranous Urethra. On each side, close behind the urethra, look for Cowper's Glands and isolate them. Clean the Deep Transverse Perineal (*transversus perinæi profundus*) Muscle (also called *compressor urethræ*).

Piercing this muscle near its osseous attachment on each side, are the Internal Pudic (or *pudendal*) Vessels and Nerve, which should now be cleaned. Now remove all the fat from this area and clean the surface of the Deep (Superior) Layer of the Triangular Ligament. Incise the deep triangular ligament on one side in order to open up the Anterior Extension of the Ischiorectal Fossa. Remove all the fat from this region, and then follow backwards the Internal Pudic Artery and Nerve into Alcock's Canal. Slit this canal open in order to expose it fully.

Alcock's Canal is formed by the lower part of the ischiorectal portion of the Obturator Fascia. It is about 1 inch above the level of the margin of the tuberosity of the ischium.

PERINEUM PROPER (FEMALE)

Place the body on its back and secure it in the lithotomy position. On both sides, make a skin incision in the Genitocrural Crease, continue both incisions forwards, and then curve them so that they will meet above the Mons Veneris and include it. Dissect the skin toward the midline as far as the margin of the vulva, then trim it away from the margin of the vulva with a pair of scissors. Do not attempt to remove any of the underlying fat with the skin. Pick up the Long Pudendal Nerve (*n. pudendus externus*) and trace it out. Beginning in the Genitocrural Crease, cut carefully through the thick superficial fatty layer of the superficial fascia until you reach the thin fibrous layer of the superficial fascia. In the perineum, this fibrous layer is known as Colles' Fascia. It becomes very thin

toward the midline. Reflect the fatty layer inwards, toward the midline, following the plane of Colles' Fascia until you reach the margin of the vulva, then trim it away with scissors.

Be very cautious not to cut away Colles' Fascia, especially as you approach the midline. Detach Colles' Fascia from the ischial tuberosity and along the outer lip of the lower margin of the ischiopubic ramus, and reflect it toward the midline. As you progress, detach it posteriorly from the free border of the triangular ligament, and remove it as you did the fatty layer.

This opens up the Superficial Perineal Interspace, which is the interval between the Colles' Fascia and the Superficial (Inferior) Layer of the Triangular Ligament. The triangular ligament and perineal interspaces are necessarily much smaller in the female than in the male, on account of their being traversed by the vagina. Most of the analogous structures are much smaller and less well defined in the female than in the male. In the Superficial Perineal Interspace, on each side, you will find the Crus Cavernosum (*crus clitoridis*), covered by the Ischiocavernosus Muscle. Free it from fat. Near the free margin of the triangular ligament you should find the Superficial Transverse Perineal Muscle. Usually it is small and indistinct. Crossing this muscle or piercing it from behind forwards are the Superficial and Transverse Perineal Vessels and Nerves. These should be carefully traced out. In each Labium Majus, you will find the Bulbus Vestibuli covered by the Bulbocavernosus (*constrictor vaginae*) Muscle. Clean this muscle, working from

behind forwards. Free the outer edge of the Bulbo-cavernous Muscle and lift it up.

Lying underneath it, at the back part, is the Gland of Bartholin (*glandula vestibularis major*), and from there forwards you will find a tangled mass of blood-vessels, forming the Bulbus Vestibuli. Having isolated the foregoing structures, remove all the fat from this area and expose the Superficial Layer of the Triangular Ligament. Incise this layer along and just internal to the Crus Clitoridis. This opens up the Deep Perineal Interspace, which is the interval between the Superficial Layer and the Deep Layer of the Triangular Ligament.

Putting a sound into the urethra will enable you to easily locate and clean its outer surface. Running outwards from in front of the urethra, you will find the Transversus Perinæi Profundus (*compressor urethræ*) Muscle. Close to the margin of the Ischiopubic Ramus, look for the Internal Pudic (*a. pudenda interna*) Artery and Nerve (*n. pudendus*). Trace them forwards. Remove all the fat from this region and expose the Deep (Superior) Layer of the Triangular Ligament. Incise this deep layer and open up the Anterior Extension of the Ischiorectal Fossa. Pick up the Internal Pudic (*a. pudenda interna*) Artery and Nerve (*n. pudendus*) and follow them backwards through Alcock's Canal, slitting the canal open as you go. This canal has already been explained in connection with the male perineum (*q. v.*).

THORAX AND ITS CONTENTS

Detach the Pectoral Muscles from the ribs. Divide the sternum transversely, immediately below the level

of the first pair of costal cartilages. It will be better to saw only part way through the bone and then to complete the saw-cut with bone-forceps or a sharp flat chisel. On each side extend this cut laterally, through intercostal muscles and pleura, as far as the anterior axillary line. Take a costotome and divide the second rib where it is crossed by the anterior axillary line; continue downwards in this line, dividing the pleura, intercostal muscles, and ribs until you have cut the eighth rib or until you reach the diaphragm. It may be necessary to cut the ninth rib and sometimes even the tenth, but in any event, avoid cutting through the diaphragm. Therefore, as this procedure is to be carried out on both sides, it will be safer not to sever the lowermost ribs until after lifting up the sternum. Lift up the lower portion of the sternum and detach the underlying pleuræ, superior sternopericardial band, and areolar tissue from its posterior surface.

This large sternocostal flap is to be bent down until it lies flat on the belly, and it should be secured there by a belt of twine. While doing this, it will be easy to determine how many of the lower ribs need to be cut. On the posterior surface of this flap, you can study the Internal Mammary Arteries, the Triangulares Sterni Muscles, and the Lower Sternopericardial Band.

Fold the skin of the chest over the cut ends of the ribs and sew it fast in this position, in order to protect your hands from the sharp ends of the ribs. Do not remove any of the organs from the chest. It is *imperative* that every one of them be retained in its natural position. Do not open the Pericardium. If

it has been opened accidentally, then sew up that opening before proceeding any further. You now have before you, widely open, both of the pleural cavities, the Superior Mediastinum and the Anterior Mediastinum (or Interpleural Space), which should now be studied.

The Phrenic Nerves (*nn. phrenici*) should now be lifted up and cleaned. Each of them will be found crossing in front of the "root" of the lung and running downwards, between the pleura and the pericardium, or on the front of the pericardium, to reach the diaphragm. The Right Phrenic pierces the diaphragm immediately to the left of the opening (*foramen venæ cavæ*) for the Inferior Vena Cava (*post cava*). The Left Phrenic pierces the diaphragm immediately to the left of the attachment of the pleura and diaphragm to each other. You should now find the Pneumogastric (*nn. vagi*) Nerves, so that you will know where they are, in order to avoid injuring them. Do not try to work them out as yet, simply identify them.

You will find the Left Pneumogastric Nerve (*n. vagus sinister*) running downwards, crossing in front of the Arch of the Aorta (*arcus aortæ*), and then passing behind the root of the left lung.

The Right Vagus (*n. vagus dexter*) is much more deeply situated than the left. You will find it embedded in the loose areolar tissue on the right side of the trachea. It runs downwards behind the root of the right lung.

Free the right lung from any pleural adhesions there may be. Put your hand down under it, lift it up out of the chest, and turn it over to the left as far as you can.

With the right lung out in this position, look for the Vena Azygos Major (*v. azygos*). You will find it running upwards along the sides of the bodies of the vertebrae.

Tear through the pleura just to the left of the Azygos Vein and look for the Thoracic Duct (*ductus thoracicus*). You will find it lying in the loose areolar tissue between the Azygos Vein and the Aorta. It is brownish-red in color and looks like a small, lumpy, thin-walled vein. The Right Intercostal Arteries (*aa. intercostales*) are immediately behind it and run at right angles to it. Replace the right lung, and then carry out the following steps in exactly the following order:

1. Trace out and clean the Left Pneumogastric Nerve (*n. vagus sinister*). You will find it running downwards in front of the Arch of the Aorta (*arcus aortæ*), behind the root of the left lung, in close contact with the back of the bronchus, on the front of the esophagus, to the Plexus Gulæ (*esophageal plexus*), and from thence through the esophageal opening of the diaphragm. Be careful not to divide its pulmonary branches behind the bronchus or its communicating branches. Again lift out the right lung.

2. Clean the Vena Azygos Major (*v. azygos*). Begin between the crura of the diaphragm and follow it up the sides of the vertebra, behind the root of the right lung, then, curling around the root of the lung in contact with the right bronchus and Pneumogastric (*n. vagus*), to the Superior Vena Cava (*precava*).

3. Trace the Thoracic Duct (*ductus thoracicus*) from the Aortic Opening (*hiatus aorticus*) of the diaphragm

upwards along the right side of the aorta in the Posterior Mediastinum (*interpleural space*), to where, at about the level of the fifth thoracic vertebra, it passes behind the aortic arch and the esophagus into the Superior Mediastinum (*interpleural space*). It is very easily torn, so you must be cautious in handling it.

4. Trace out and clean the Right Pneumogastric Nerve (*n. vagus dexter*). You will find it behind the Right Innominate Vein (*v. anonyma dextra*), running downwards along the right side of the trachea, behind the root of the right lung, where it becomes broad and flat and forms two cords, downwards behind the esophagus, where the two cords coalesce and continue, as one, through the Esophageal Opening (*hyatus œsophageus*) of the Diaphragm.

5. Lift out the left lung and clean the Vena Azygos Minor (*v. hemiazygos*), from the left crus of the diaphragm to where it crosses the eighth or ninth vertebra to join the Azygos Major. Clean the esophagus.

6. Push the esophagus towards the right, and finish tracing the Thoracic Duct through the Superior Mediastinum as far as the upper opening of the thorax. Be careful not to tear it in two.

7. Clean the Superior Vena Cava (*precava*); be careful not to cut the Azygos Major, entering it from behind or on its outer side. Clean the Right Innominate Vein (*v. anonyma dextra*); be careful of the Inferior Thyroid (*v. thyreoidea inferior*), entering it on the inner side.

Clean the Left Innominate Vein (*v. anonyma sinistra*). Be careful of the Inferior Thyroids (*vv. thyreoideæ inferiores*) entering it from above, and the Superior

Intercostal (*v. intercostalis suprema sinistra*) entering it from below.

Clean the Left Superior Intercostal, tracing it down to the Vena Azygos Tertia (*v. hemiazygos accessoria*).

8. Clean the outer surface of the Pericardium. Follow up its tubular prolongation surrounding the Pulmonary Artery (*a. pulmonalis*) and Aorta.

In front of it (Anterior Mediastinum) look for the Thymus Gland or its remains.

9. Open the Pericardium widely from in front. Study its interior (Middle Mediastinum) and note the reflections of its serous layer on to the great vessels. Take a blunt-pointed pair of scissors and split the Pericardium up to each of the great blood-vessels and trim it away from around each of them. Be especially careful not to injure the Inferior Vena Cava (*postcava*) when freeing it. It is safer to leave intact that portion of the pericardium which is attached to the left border of its opening in the diaphragm, along with the portion that is attached to the upper surface of the diaphragm. Otherwise, remove all of the pericardium. Do not remove the heart and do not cut it open. It must be kept intact and in place. Use another specimen for comparison and for the study of the interior of the heart.

10. Remove the pleura from the root of each lung. Isolate and thoroughly clean this portion of—first, the Pulmonary Vein (*v. pulmonalis*); second, just above it the Pulmonary Artery (*a. pulmonalis*); third, above the vein and behind the artery, the Bronchus. Only clean up as much of these as you find entering into the formation of the “root” of the lung.

11. Clean the Arch of the Aorta. In doing so rotate and reflect it towards the left. Clean the Ductus Arteriosus (*ligamentum arteriosum*); divide it in the middle, but pass a stitch of strong, heavy thread through both of the divided ends and tie it in a large loop. Later this will serve to draw and tie them together again; in the meantime it gives you far more room to work, and saves much time and trouble. Clean the upper part of the Thoracic Aorta.

12. Isolate the Left Recurrent Laryngeal Nerve (*n. laryngeus inferior sinister*). Follow it under the Arch of the Aorta; then upwards and obliquely inwards, behind the Aorta and the Left Common Carotid Artery (*a. carotis communis sinistra*), to the angular groove between the esophagus and trachea.

13. Finish cleaning the Pulmonary Veins (*vv. pulmonales*) and the Pulmonary Arteries (*aa. pulmonales*).

14. Clean the Innominate Artery (*a. anonyma*). Clean the Left Common Carotid (*a. carotis communis sinistra*) and Left Subclavian (*a. subclavia sinistra*) Arteries as far as the upper opening of the thorax.

15. Clean the Trachea and finish cleaning the Bronchi.

16. Clean the lower part of the Thoracic Aorta.

17. Look on the front of the heads of the ribs for the ganglia of the Gangliated Cord (*truncus sympatheticus*). They are rather white in color and are covered only by pleura. Trace the cords of the Sympathetic from above downwards.

18. Restore the severed Ductus Arteriosus. When you tie its ends together, make sure that you leave the Recurrent Laryngeal Nerve to the left of the Ductus Arteriosus.

FIG. 4.—THORAX AND ABDOMEN.

Continuous red lines indicate knife incisions. Dotted red lines show where the skin should be cut with scissors.

19. Divide the upper piece of the sternum in the midline. Saw the clavicles in the middle, and saw the first pair of ribs immediately anterior to the groove for the Subclavian Vein. Take care not to injure the vein.

ABDOMINAL WALL AND INGUINAL HERNIA. (See Fig. 4.)

Make a skin incision in the midline of the abdomen, extending from the ensiform process (xiphoid cartilage) to the symphysis pubis, encircling the umbilicus. Reflect the skin laterally as far as the anterior border of the Latissimus Dorsi Muscle. Do not make any knife incision along the line of Poupart's Ligament (*l. inguinale*), but when the skin has been dissected as far down as that, cut it with scissors from the symphysis along the line of Poupart's Ligament (*l. inguinale*), then following the crest of the ilium to the border of the Latissimus Dorsi. Begin in the midline by cutting cautiously through the layer of fat, and by reflecting it laterally expose the Linea Alba. Continue reflecting the fatty layer outwards until you have exposed the sheath of the Rectus Abdominis and the Lineæ Transversæ.

Now look for the Anterior Cutaneous Nerves which pierce the sheath of the rectus, at regular intervals, close to its outer border. There are five pairs of them. Below these, preserving the same interval, you will find the Iliohypogastric Nerve, and below it, the Ilio-inguinal Nerve as it emerges from the External (Superficial) Abdominal Ring (*annulus inguinalis subcutaneous*). Reflect the fatty layer outwards only as far as will permit of your cleaning the Linea Semilunaris. Look for the Superficial Epigastric Branch of the

Femoral Artery, running upwards across the middle of Poupart's Ligament (*l. inguinale*). Plough through the fat along the course of this artery and isolate it from the surrounding fat. Clean the anterior border of the Latissimus Dorsi Muscle in the lumbar region. Reflect the fatty layer forwards, exposing the Lumbar Fascia and the posterior border of the Obliquus Externus Muscle (Triangle of Petit). Look for the Lateral Cutaneous Nerves; they run forwards after emerging, at regular intervals, from between the digitations of the Serratus Magnus (*m. serratus anterior*) and the Lumbar Fascia. Now remove all of the fat and clean the entire extent of the External Oblique Muscle (*m. obliquus externus abdominis*). Clean the Inter-columnar Fibers (*fibræ intercrurales*) and Fascia, the Internal (Superior) Pillar (*crus superius*); the External (Inferior) Pillar (*crus inferius*), and clearly define the External (Superficial) Abdominal Ring (*annulus inguinalis subcutaneous*).

Split lengthwise, along its midline, the fascia forming the anterior lamella of the sheath of the Rectus Abdominis Muscle. At the lower end, clean the Pyramidalis Muscle. Free the Rectus Muscle, lift up its outer border, and trace up the Deep Epigastric (*a. epigastrica inferior*) Branch of the External Iliac Artery (*iliaca externa*).

Return to the Triangle of Petit and free the posterior border of the External Oblique (*m. obliquus externus abdominis*) from the lumbar fascia; thrust your finger under and free it from the underlying Internal Oblique (*m. obliquus internus abdominis*). As you progress forwards, divide the External Oblique, with scissors, until you attain the Linea Semilunaris. In

the same way lift it up and divide it along the Linea Semilunaris, reflecting the upper portion upwards and outwards, and the lower portion downwards and outwards. Be careful not to divide the Inner Column (*crus superius*) of the External Abdominal Ring (*annulus inguinalis subcutaneus*). Clean the Obliquus Internus Muscle, and divide it on a line parallel to and about 3 inches external to the Linea Semilunaris. Begin above, where the separation is easily made, and cut cautiously through the muscular fibers; separate them with your knife handle from the underlying Transversalis (*m. transversus abdominis*); continue downwards until you can no longer effect any separation. You will then have reached the Conjoint Tendon. Remove the Lumbar Fascia and clean the Quadratus Lumborum Muscle. Reflect the outer portion of the Internal Oblique outwards and expose the Transversalis. Do not interfere with the Spermatic Cord (or Round Ligament) otherwise than to fully expose it in the Inguinal Canal. You now have before you the parts involved in Inguinal Hernia, as seen from in front.

INGUINAL AND FEMORAL HERNIA FROM BEHIND

In order to study this region from behind, the abdominal wall should be divided transversely above the level of anterior superior spines of the ilia. Having done this, inspect the peritoneal surface of the lower portion (note the position of the Urachus in the midline) and divide it along the right side of the urachus down to the Symphysis Pubis. Reflect each side downwards and outwards and study its peritoneal surface. On

one of the flaps you will see the Urachus, forming the so-called Median Cord.

Immediately external to the Urachus, and lying between it and the obliterated Hypogastric Artery (*ligamentum umbilicale laterale*), is the Internal Peritoneal Fossa. This fossa is directly behind the External Abdominal Ring (*annulus inguinalis subcutaneous*), and it is here that a direct hernia takes place.

Between the Obliterated Hypogastric Artery (*ligamentum umbilicale laterale*) and the Deep Epigastric Artery (*a. epigastrica inferior*) is the Middle Peritoneal Fossa. It corresponds to the posterior wall of the Inguinal Canal. It is not the seat of hernia and is likely to be entirely obliterated by an oblique hernia, and also by a large direct hernia.

Just external to the Deep Epigastric Artery (*a. epigastrica inferior*) is the External Peritoneal Fossa. This corresponds to the Internal Abdominal Ring (*annulus inguinalis abdominis*), and this is the part which is ruptured when an oblique hernia enters the inguinal canal. An oblique hernia may so distend the internal abdominal ring that the inguinal canal may no longer exist as a canal, and the internal ring will then coincide with the external ring, which will also be distended. You can now understand why the Deep Epigastric Artery (*a. epigastrica inferior*) is always to the inner side of an oblique hernia, and to the outer side of a direct inguinal hernia. Therefore the displacement of this artery is important surgically. Note the position of Poupart's Ligament (*l. inguinale*).

Note the Femoral Fossa just below the ligament and internal to the Iliac Vessels as they pass under

the ligament. Thrusting the bladder out of the way, you should be able to feel the inner opening of the Obturator Canal. Strip the peritoneum away from the abdominal flaps and expose the Urachus, posterior surface of the Rectus Muscle, Obliterated Hypogastric Artery, and posterior surface of the Conjoint Tendon (floor of Hesselbach's Triangle).

Carefully clean the Deep Epigastric Artery and the Internal Abdominal Ring. Follow the Transversalis Fascia into the ring. Isolate the Vas Deferens (*ductus deferens*) or Round Ligament (*l. teres uteri*), entering the internal ring from below, and the Spermatic Vessels (*vasæ spermaticæ internæ*), entering the ring on its outer side. Note that the Spermatic Cord is formed in the inguinal canal. Remove the peritoneum from Poupart's Ligament and the Iliac Vessels. Clean the posterior surface of Gimbernat's Ligament and define the Femoral Ring. Note the Transversalis Fascia following the Iliac Vessels under Poupart's Ligament. Note the Iliac Fascia following the under surface of the Iliac Vessels under the ligament where it joins with the Transversalis Fascia to form the sheath of the Femoral Vessels. Clean the Obturator Artery. It is sometimes a branch of the External Iliac, sometimes a branch of the Deep Epigastric.

ABDOMINAL CONTENTS

After the abdominal wall has been thoroughly dissected, its upper portion should be divided vertically, slightly to the left of the umbilicus. The flaps should be reflected upwards and outwards. Note the Round Ligament of the liver running upwards and

outwards from the umbilicus. Study the disposition of the Great (or Gastrocolic) Omentum. Study the disposition and the distinguishing features of the Small and Large Intestines. Identify the subdivisions of each. Carefully work out the Superior Mesenteric Artery (*a. mesenterica superior*) and then the Inferior Mesenteric Artery (*a. mesenterica inferior*). Work out the blood-supply of the Appendix Vermiformis (*processus vermiformis*). Tie two strong ligatures around the Small Intestine just below the Duodenum, and divide the intestine between them. In the same way tie two ligatures around the Large Intestine just above the Rectum, and divide it. Tie the Superior Mesenteric Vessels close to their origin and cut away the Mesentery. In the same way tie the Inferior Mesenteric Vessels and remove the Mesocolon. Free the Cecum and Ascending Colon from their attachment to the abdominal wall. Remove all the foregoing structures from the abdomen, but no other abdominal organ is to be removed at any time. Remove the Lesser (or Gastrohepatic) Omentum. In front of the commencement of the abdominal aorta, look for and isolate the Solar Plexus (*plexus cæliacus*). Immediately to the left of the Celiac Axis (*a. cæliaca*) look for and isolate the Left Semilunar Ganglion (*g. cæliacum*), with the Left Large and Small Splanchnic Nerves entering into its lower part from above. To the right of the Celiac Axis, on the front of the right crus of the diaphragm, look for and clean the Diaphragmatic Ganglion (*g. phrenicum*). Be careful not to injure the Inferior Phrenic Artery as it crosses the crus directly behind the ganglion or slightly above it.

Slightly below the level of the Diaphragmatic Ganglion (*g. phrenicum*) look for the Right Great Splanchnic Nerve as it passes outwards from behind the right crus of the diaphragm. Follow the Great Splanchnic Nerve and it will lead you to the Right Semilunar Ganglion (*ganglion cœliacum*).

Emerging from behind the right crus of the diaphragm, in the same way as did the Great Splanchnic, but at a lower level, you will find the Right Lesser Splanchnic Nerve, which, when followed, will lead to the Right Renal Ganglion on the Right Renal Artery.

It will now be necessary to divide the communications between the right and left portions of the Solar Plexus (*plexus cœliacus*) in order to fully expose the Celiac Axis (*a. cœliaca*). Let its Hepatic and Splenic Branches alone until later, but follow out the Gastric (Middle Branch) now. Remove the entire Great Omentum (*gastrocolic*) and fully expose the arterial "Gastro-epiploic Arch." On the cardiac end of the stomach, look for the Vasa Brevia (*aa. gastricæ breves*) Branches of the Splenic Artery (*a. lienatis*). Free the Spleen and the "Tail" of the Pancreas from their attachments to the abdominal wall. Lift up the stomach, spleen, and pancreas, and turn them upwards, all at the same time.

Work out the Splenic Artery (*a. lienalis*) and its branches, the Vasa Brevia (*aa. gastricæ breves*) and Gastro-epiploica Sinistra. Just below the origin of the Renal Arteries, look for the Spermatic (or Ovarian) Arteries, and isolate them now before they get injured.

Return to the celiac axis and clean the Pancreatico-duodenal Branch of the Hepatic Artery. Free the "Head" of the Pancreas and the descending portion

of the Duodenum from their attachments to the abdominal wall. Turn the Pancreas and Duodenum upwards and clean the Common Bile Duct (*ductus choledochus*) and its branches. It is now possible to clean the main trunk of the Hepatic Artery, after which it becomes easy to follow out and clean the Portal Vein.

Clean the Renal Veins and the Left Spermatic (or Ovarian) Vein. Clean the upper portion of the Vena Cava as far as the posterior fissure of the liver, then clean the Right Spermatic (or Ovarian) Vein. Remove the overlying peritoneum from the Kidneys and Adrenals. Remove all fat from around them. Free the Kidneys and reflect them toward the midline.

Clean first the Renal Arteries, then clean the Ureters, and follow the latter down to the bladder.

Strip off the peritoneum and clean the Abdominal Aorta and both Common Iliac Arteries. Clean the lower portion of the Vena Cava and the Common Iliac Veins. By lifting these blood-vessels forwards and toward the left, it will be possible to expose the Receptaculum Chyli (*cisterna chyli*). You will find it lying on the front of the body of the second lumbar vertebra in the interval between the Aorta and the fleshy portion of the right Crus of the diaphragm. The Vena Azygos Major is to the right of it.

Clean the Receptaculum Chyli (*cisterna chyli*), following it upwards along the right side of the Aorta to the aortic opening of the diaphragm.

Carefully clean the upper portion of the Aorta and then clean the Esophagus.

Clean the Phrenic Arteries. You will find them coming off the aorta just above the celiac axis, singly

or by a common trunk, then running outwards across the crura of the diaphragm under cover of the peritoneum.

Follow the thoracic portions of the Phrenic Nerves through to the under surface of the diaphragm and trace out their distribution.

Locate the tip of the left transverse process of the second lumbar vertebra. Running from this to the tip of the twelfth rib you will find the External Arcuate Ligament (*arcus lumbocostalis lateralis*), arching across the front of the Quadratus Lumborum Muscle.

From the same starting-point you will find the Internal Arcuate Ligament (*arcus lumbocostalis medialis*) arching across the front of the Psoas Muscle to reach the body of the second lumbar vertebra.

Clean the Crura and the Intercrural Arch of the Diaphragm.

Remove the overlying peritoneum and work out the Lumbar and Sacral Plexuses. In cleaning the sacral plexus be careful not to injure the Internal Pudic (*a. pudenda interna*) and Sciatic (*a. glutæa inferior*) Arteries.

PELVIC CONTENTS IN GENERAL

Remove the parietal peritoneum and clean the Urachus down to the bladder. Be careful in doing so, not to injure the Ureters, Vasa Deferentia (or Round Ligaments of the Uterus), or the Spermatic (or Ovarian) Arteries.

The Right Vas Deferens (or Round Ligament) and the right Spermatic Artery will have to be divided near the the internal abdominal ring, but all of the

other named structures must be freed, so that they can be retracted toward the midline.

Dismemberment of Lower Extremity.—Remove as much as you can of the peritoneum covering the pelvic viscera. Clean the Internal Iliac Arteries and then the corresponding veins. The Right Innominate Bone (*os coxæ*) is to be disarticulated, but before doing so, carry out the following steps: Divide the right external iliac vessels between two ligatures. Divide the muscular attachments along the upper border of the crest of the right ilium. Divide the Levator Ani Muscle along the “White Line” of the obturator fascia. The bladder must be pushed back out of the way and the Symphysis Pubis divided. Divide the muscles and fasciæ attached along the inner side of the lower border of the Ischiopubic Ramus. Divide the Lumbar and Sacral Plexuses and the Psoas Muscle. Disarticulate the Sacro-iliac Joint. This can readily be done from in front if, while doing so, the divided symphysis be forced widely apart. Sever the remaining Sacro-iliac Ligaments, the Greater and Lesser Sacrosciatic Ligaments, and the Pyraformis Muscle. After the removal of the right extremity, trim away the ragged edges of the Perineal Muscles.

Trace the Obliterated Left Hypogastric Artery down to the Anterior Division of the Internal Iliac Artery. Using your finger, carefully free the anterior wall of the bladder. This opens up the “Cave of Retzius.” In the same way carefully free the Rectum on all sides. Use only your finger, in order to be sure not to destroy any of the arteries. Clean the Middle Sacral Artery and then the two Lateral Sacral Branches

of the Posterior Division of the Internal Iliac Artéry. Isolate the Superior Hemorrhoidal Branch of the Inferior Mesenteric Artery, and then the Middle Hemorrhoidal Branch of the Anterior Division of the Internal Iliac Artery. Thoroughly clean the surface of the Rectum, trace out the Inferior Hemorrhoidal Branch of the Internal Pudic (*a. pudenda interna*), clean the Internal Sphincter Ani Muscle and the back part of the Levator Ani Muscle. It may be found necessary to temporarily remove the packing from the rectum, but it should later be repacked, less tightly than at first.

PELVIC VISCERA (MALE)

Carefully trace the Ureters and the Vasa Deferentia (*ductus deferentes*) to the back of the base of the bladder. At the point where the Obliterated Hypogastric Artery joins the Anterior Division of the Internal Iliac you will find the Superior Vesical Artery. Trace out this artery over the fundus of the bladder. Look for and clean the Middle Vesical Artery. This artery may be a branch of the Superior Vesical or, as is often the case, both arteries may be branches of the Hypogastric, which has remained patent at its lower end. Coming off the anterior division of the Internal Iliac close to or in common with the Middle Hemorrhoidal, look for the Inferior Vesical Artery, and carefully trace out its branches.

The fundus of the bladder may later be opened transversely. Further instructions are given following those for the female pelvis.

Carefully isolate the Vesiculæ Seminales, then clean the Prostate and Membranous Urethra.

PELVIC VISCERA (FEMALE)

Using your finger only, free the anterior wall of the bladder. Separate the bladder from the uterus and vagina, then separate the rectum from the uterus and vagina.

The dissection of the rectum and its arteries has already been given (*q. v.*).

Isolate the Ovarian Arteries. Trace out the Round Ligament of the Uterus. Note the Small Funicular Artery which is accompanying it. Trace the Uterine Artery. You will find it coming off the anterior division of the Internal Iliac close to, or in common with, the Middle Hemorrhoidal or the Inferior Vesical. Isolate the Ureters down to the bladder. Trace out the Vaginal Branches of the Anterior Division of the Internal Iliac. Remove the packing from the vagina. Clean the surface of the vagina on all sides, and on its front surface trace out the Azygos Vaginæ Artery. Clean the Sphincter Vaginæ Muscle. The vagina may later be opened laterally. The dissection of the bladder and its blood-supply has already been given (*q. v.*).

PELVIC CONTENTS IN GENERAL (Concluded)

Retract the Pelvic Viscera towards the right side. Clean the pelvic portions of the Internal Pudic, Obturator, and Sciatic Arteries.

Reflect the Psoas Muscle toward the midline, and trace out the pelvic portions of the Gluteal and Iliolumbar Branches of the Posterior Division of the Internal Iliac Artery.

Remove all loose fat and clean the anterior portion of the Levator Ani Muscle.

Clearly define the "White Line" of the Obturator Fascia.

SPERMATIC CORD AND TESTICLE. (See Fig. 11.)

Make an incision from the external abdominal ring down the side of the Scrotum. The scrotum consists of an outer layer (skin) and an inner layer (Dartos), which also forms its septum. The skin and dartos are not readily separable, and it need not be attempted. It is easy, however, to shell out the testicle and cord with their outer coverings, because the only point of adhesion between the Dartos and the External Spermatic Fascia is just opposite the lower end of the testicle, and it is not extensive nor is it hard to tear away. Free the testicle and cord with your finger and lift them out of the scrotum. Open the Tunica Vaginalis and expose the Testicle and Epididymis.

On the front end of the testicle note the Hydatid of Morgagni. On the outer side, between the border of the testicle and the epididymis, note the Digital Fossa. Incise the visceral layer of the Tunica Vaginalis along the outer side of the epididymis. Carefully separate the Vas Deferens (*ductus deferens*) from the back of the epididymis. Between them, at the lower part, look for the Vas Aberrans, much doubled up on itself and 3 to 15 inches long. Incise longitudinally the Intercolumnar (External Spermatic) Fascia at the upper part of the cord. This will expose the muscular loops of the Cremasteric (Middle Spermatic) Fascia and the Cremasteric Artery. Separate the loops of the Cremasteric Fascia and expose the Infundibuliform (Internal Spermatic) Fascia. Upon

opening the infundibuliform fascia, you will encounter an unnamed laminated prolongation of the subperitoneal tissue, surrounding the cord and binding its elements together. This layer corresponds to the visceral layer of the tunica vaginalis of the testicle, while the infundibuliform fascia corresponds to the parietal layer of the tunica vaginalis. Incise this visceral layer of the Infundibuliform Fascia and separate the structures forming the cord.

The front part of the cord consists mainly of the large mass of the Pampiniform Plexus of Veins surrounding the large Spermatic Artery. The back part of the cord consists of the hard, cord-like Vas Deferens (*ductus deferens*), accompanied by a smaller Deferential Artery and the smaller mass of Deferential Veins. At the inguinal portion of the cord, look for the funicular Processus Vaginalis of the Peritoneum (Ligament of Cloquet). In the inguinal canal it is usually above the other elements of the cord; then it runs down their outer side to the tunica vaginalis. When obliterated it is usually a thin thread-like cord, but sometimes it is patent, and may then become enlarged into a "hydrocele of the cord."

PENIS AND MALE URETHRA

Incise the skin along the midline of the dorsum of the penis from the mons veneris to the corona, then laterally around the neck, just back of the glans, to the frenum. Reflect this skin-dartos layer laterally. Trace out the Superficial Dorsal Vein lying in the areolar layer.

Clean the Suspensory Ligament. Incise the Deep

Fascia in the same way that you did the skin-dartos layer and reflect in the same way. In the dorsal mid-line look for the Deep Dorsal Vein, and on each side of the vein look for a Dorsal Artery, and on the outer side of each artery look for a Dorsal Nerve.

In the Sulcus, below and between the Corpora Cavernosa, isolate the Corpus Spongiosum (*corpus cavernosum urethræ*).

Incise the Tunica Albuginia laterally, and examine the structure of one of the Corpora Cavernosa. Incise the Tunica Albuginia and both Corpora Cavernosa transversely. Note the tunica albuginia entering between the corpora, forming the Septum Pectiniforme. Lay open the Urethra along its under side from the meatus to the membranous portion.

The membranous and prostatic urethra and the bladder are best seen when layed open, respectively, from above and in front. In order to do this, it is now permissible to remove them from the pelvis.

THE MUSCLES OF THE BACK

The Trapezius, both Rhomboidei, and the Latissimus Dorsi have already been dissected, and should all be detached from the spine and removed. Clean the Serratus Posticus Superior, detach it from the spine, and reflect it outwards. Clean the Serratus Posticus Inferior, but do not divide it in any way. Thoroughly clean the Vertebral Aponeurosis, incise it throughout its length, close to the spine, and reflect it outwards, away from the spine. Separate the Erector Spinæ Mass into its outer, middle, and inner columns.

SPINAL CORD

The usual procedure is to open the Neural Canal, throughout its length, from behind.

Another method, which sometimes proves useful, is to open the cervical, thoracic, and lumbar portions of the Neural Canal from in front, the sacral portion being opened from behind.

In the first method, which is the more convenient, it is necessary to first remove the muscles which occupy the spinal groove, on each side of the spinous processes, before removing the neural arches of all of the vertebræ and the sacrum. In removing the neural arches it is best to begin with the upper thoracic vertebræ by sawing through the laminae on each side, and continuing in this way down to the sacrum. In the cervical region and the sacrum it is more convenient to divide the laminae with bone-forceps. The secret of using bone-forceps with ease and rapidity, is to avoid trying to cut away too much at a time. Small bites are not only easier to cut, but also lead to accuracy and rapidity, without danger of breaking the forceps.

In opening the neural canal from in front, your object is to remove the bodies of the vertebræ instead of their neural arches.

In the cervical region, use bone-forceps for cutting the costotransverse processes.

In the thoracic region, divide the necks of the ribs with bone-forceps and remove the heads of the ribs, then cut through the pedicles of the vertebræ with a sharp flat chisel or an osteotome. In the lower thoracic and lumbar vertebræ you can saw through the pedicles.

It is always more convenient to open the sacral portion of the neural canal with bone-forceps from behind.

Opening the neural canal from in front has the advantage of making it easy to get out all of the spinal nerves, but it has the great disadvantage of utterly ruining a good dissection of the thorax and abdomen.

When the neural canal has been opened for its entire length, divide the membranes as close to the foramen magnum as you can.

Withdraw the Spinal Nerves as far as you can by gentle traction, and divide them as close to the intervertebral foramina as may be possible. Try to divide the Spinal Nerves beyond their ganglia. If the specimen is quite fresh, it will be better to harden it by placing it in alcohol or formalin for a few days before dissecting it. The specimen should then be pinned down in a black, wax-lined tray and dissected under water. If the specimen is not fresh, there will be no advantage in attempting to harden it.

Pin the specimen down with its posterior surface uppermost. Open the Dura longitudinally in the midline, reflect it laterally, split it outwards over several of the spinal nerves, then pin it down. This exposes the Arachnoid.

Along the sides midway between the spinal nerves note the processes of the Ligamentum Denticulatum (Dentate Ligament). Note also that there are none below the point where the cord terminates. It is a good plan to partly fill the subarachnoid space with air. A blowpipe will serve for that purpose. By pressing the air from place to place, it becomes easy to define

the extensions and limits of the subarachnoid space. For example, it will enable you to see that the processes of the dentate ligament are merely covered by the arachnoid. Open the Arachnoid by a mesial incision.

On each side, just back of the posterior roots of the spinal nerves, look for the Posterior Spinal Arteries. Reverse the specimen and pin it down with its anterior surface uppermost. Open the Dura and Arachnoid in the same way as before. Note the processes of the dentate ligament, and the smaller, more widely spread anterior roots of the spinal nerves.

In the middle of the front surface of the cord note the Linea Splendens; trace it downwards and isolate the Filum Terminale from among the nerve-roots constituting the Cauda Equina. Incise the Pia Mater close to the linea splendens and look for the Anterior Spinal Artery. Split the investment of a spinal nerve and its ganglion.

It may be possible to make transverse sections of the cord itself at various levels.

UPPER EXTREMITY

ORDER OF DISSECTIONS

1. Trapezius and Latissimus Dorsi.
2. Shoulder.
3. Pectoral Muscles and Axilla.
4. Arm.
5. Dismemberment.
6. Forearm, superficial dissection.
7. Back of Forearm and Hand.
8. Palm of Hand, superficial dissection.
9. Front of Forearm, deep dissection.
10. Antecubital Space.
11. Hand, deep dissection.

TRAPEZIUS AND LATISSIMUS DORSI

Make a skin incision in the midline of the back, extending from the root of the neck to the level of the sacrum.

From the lower end of this incision, make another, following the crest of the ilium outwards, as far as the middle of the crest. From near the outer end of the acromion process, make an incision following the line of the spine of the scapula to the midline incision. Beginning in the midline incision, reflect the skin outwards as far as the posterior axillary line. Clean the thoracic portion of the Trapezius Muscle, working from the midline outwards. Carefully free its outer border, and free the entire muscle from the underlying muscles.

FIG. 5.—BACK OF ARM AND BACK OF THORAX.

Knife incisions are indicated by continuous red lines. Where the skin should be cut with scissors is shown by dotted red lines.

Clean all of the Latissimus Dorsi Muscle, working upwards and outwards from the midline. Define its outer border and thoroughly free this muscle from the underlying muscles. Divide the Right Trapezius along its spinal attachment. In order to avoid cutting the Rhomboidei at the same time, it is best to use blunt-pointed scissors and to carefully free the muscle in advance with your fingers, and to cut it about 1 inch from the spine. The thoracic portion of the Right Trapezius should be reflected upwards, and left attached to the spine of the scapula.

Divide the Left Trapezius along its attachment to the spine of the scapula; carefully free it from the underlying muscles and reflect it toward the midline. The dissection of the cervical portion of the Trapezius is described with the Superficial Dissection of the Back of the Neck (*q. v.*).

SHOULDER

After the upper portion of the Trapezius has been dissected, clean the lower part of the Levator Anguli Scapulæ (*m. levator scapulæ*). Under this muscle, look for and clean the Posterior Scapular Branch (*ramus descendens*) of the Transverse Cervical Artery (*a. transversa colli*) from the Thyroid Axis (*truncus thyreocervicalis*). Clean the Supraspinatus Muscle.

At the upper border of the scapula, near the base of the coracoid process, look for the Suprascapular (*a. transversa scapulæ*) Branch of the Thyroid Axis (*truncus thyreocervicalis*). Passing through the suprascapular notch just beneath the Suprascapular Artery (*a. transversa scapulæ*), look for the Suprascapular

Nerve (*n. suprascapularis*). Be careful not to injure the Omohyoid Muscle (*m. omohyoideus*).

Clean the Infraspinatus Muscle and the Teres Minor Muscle, but do not attempt to separate them until after you have identified their insertions on the humerus. By following back their tendons it becomes quite easy to separate them. However, it will be best not to attempt this until the Deltoid Muscle has been cleaned and can be lifted up without being cut. Clean the Teres Major Muscle, and separate it above, from the Teres Minor and below, from the Latissimus Dorsi. Clean the Rhomboideus Minor and the Rhomboideus Major Muscles.

With the arm at the side of the body, make an incision from the outer end of the acromion process down the outer side of the arm to a point at least 2 inches below the outer condyle of the humerus. Reflect the skin far enough on each side of this incision to fully expose the deltoid. Do not make any knife incision along the clavicle; it is much safer to snip the skin with scissors as you advance. Thoroughly clean the Deltoid Muscle, working from above downwards. Be careful not to injure the Cephalic Vein or the Humeral Branch (*ramus deltoideus*) of the Acromiothoracic Artery (*a. thoracoacromialis*) (or Thoracic Axis), both of which you will find in the interval between the anterior border of the Deltoid and the Pectoralis Major. The Deltoid must not be divided. By abducting the arm it is possible to relax the Deltoid sufficiently to allow of your thoroughly freeing it and lifting it up far enough to clean and separate the underlying tendons. Clean the tendons of the Infraspinatus

and Teres Minor, separate the muscles, and look for the Dorsalis Scapulæ (*a. circumflexa scapulæ*) Branch of the Subscapular Artery. You will find it running upwards under cover of the Infraspinatus Muscle.

Clean the tendinous upper portions of the outer head and the long head of the Triceps (*triceps brachii*). Between them, emerging from the Quadrilateral Space, look for the Circumflex Nerve (*n. axillaris*) and the Posterior Circumflex (*a. circumflexa humeri posterior*) Branch of the Axillary Artery (*a. axillaris*). In the interval between the Teres Minor and the Teres Major, look for the lower branch of the Dorsalis Scapulæ Artery (*a. circumflexa scapulæ*).

THE PECTORAL MUSCLES AND AXILLA

Make a midline incision from the suprasternal notch to the Ensiform Process (or Xiphoid Appendix). Begin in this incision and reflect the skin outwards, dividing it along the line of the clavicle with scissors. Do not make any knife incision along the clavicle. Remove the skin from the arm as far down as the bend of the elbow. At the level of the bend of the elbow, the skin must be cut circularly around with scissors, not a knife. Always avoid transverse knife incisions of the skin whenever it is possible to do so.

Clean the Pectoralis Major Muscle and remove all of its sheath clear to the axillary border, working from the midline outwards, with a pair of blunt-pointed scissors "curved on the flat." Free the axillary border of the Pectoralis Major with your fingers. Do not use a knife in the axilla for any purpose whatever. In the axilla, *use only your forceps or your fingers*,

FIG. 6.—PECTORAL REGION AND FRONT OF ARM AND FOREARM.

Knife incisions are indicated by continuous red lines. The dotted red lines show where the skin should be cut with scissors.

and blunt-pointed scissors, sometimes; but a knife, *never*. In the loose cellular tissue of the axilla, look for the Intercostohumeral Nerve (*n. intercostobrachialis*); there may be two. You will find it running parallel to, but just hidden by, the axillary border of the Pectoralis Major Muscle. In order not to injure the nerve, tear the loose cellular tissue transversely with two pairs of forceps or with your fingers.

Follow the Intercostohumeral Nerve (*n. intercostobrachialis*) down the arm and clean it carefully.

Clean the axillary border of the Latissimus Dorsi Muscle. In the loose cellular tissue just in front of it, look for the Posterior Thoracic Nerve—External Respiratory of Sir Charles Bell—(*n. thoracalis longus*), running downwards on the chest wall. Thrust your fingers under the Pectoralis Major, lift it up gently, and feel for the vessels and nerves which enter it from behind. Having definitely located them, divide the muscle with a pair of scissors just externally to its nerve and blood-supply. Divide its clavicular origin close to the bone, and reflect it outwards. Remove all the underlying areolar tissue, fat, and lymphatics, and clean the Pectoralis Minor Muscle and the Costocoracoid Membrane (*fascia coracoclavicularis*). Free the outer border of the Pectoralis Minor. Locate the blood-vessels and nerves which enter it from behind. Divide it just above them and reflect it and the Costocoracoid Membrane (*fascia coracoclavicularis*) upwards and inwards.

Do not attempt to remove any of the fat or lymphatic glands from the axilla itself, until all of the important structures in it have first been thoroughly isolated.

Incise the Superficial Fascia over the Basilic Vein (*v. basilica*) in the arm. Pick up the Basilic Vein (*v. basilica*), clean it carefully, and follow it up into the axilla and clean the Axillary Vein (*v. axillaris*). It will be necessary to tie and cut off many of the small branches (tributaries) of both these veins. Clean the upper part of the Brachial Artery, follow it up into the axilla, and clean the Axillary Artery. You must not divide any one of the branches of these arteries, but should you do so accidentally, immediately tie it together again with a piece of fine thread. In cleaning these arteries, remove their sheath and their venæ comites as well. Carefully clean each of the branches of the Axillary Artery. The branch requiring the most care is the small Anterior Circumflex Artery (*a. circumflexa humeri anterior*). It runs between the Coracobrachialis Muscle and the tendon of the Latissimus Dorsi. Isolate and clean the large Nerve-bundle of the Brachial Plexus.

Clean the tendons of the Pectoralis Major, Latissimus Dorsi, and Subscapularis. Remove all of the fat and lymphatic glands from the Axilla and from behind the Costocoracoid Membrane. Clean the Subclavius Muscle. Finish cleaning the Subscapular Artery. Clean the Subscapularis Muscle and the Serratus Magnus (*m. serratus anterior*) Muscle. Separate and clean the Cords of the Brachial Plexus.

THE ARM

Clean the Cephalic Vein; then remove all the fat and the superficial fascia as far down as the bend of the elbow. Be careful not to divide the Intercostohum-

eral Nerve (*n. intercostobrachialis*). Clean the Biceps Muscle. Finish cleaning the Basilic Vein. It may be necessary to tie and cut away many of its smaller tributaries. Clean the Median Nerve (*n. medianus*), and then clean the Brachial Artery, but do not yet attempt to follow out its branches.

Clean the Musculocutaneous Nerve and the Coracobrachialis Muscle. Clean the posterior surface of the Biceps and the anterior surface of the Brachialis Anticus Muscle (*m. brachialis*). Clean the Ulnar Nerve (*n. ulnaris*) and both of the Internal Cutaneous Nerves (*nn. cutanei, antebrachii et brachii mediales*). Clean the Circumflex Nerve (*n. axillaris*), Musculospinal Nerve (*n. radialis*), and the Superior Profunda (*a. profunda brachii*) Branch of the Brachial Artery. Clean the Triceps Muscle.

Clean the remaining branches of the Brachial Artery, but do not attempt to follow any of them below the level of the elbow.

DISMEMBERMENT

As soon as progress in the dissection of the shoulder, neck, and thorax will admit of it, the arm should be dismembered from the body. If several students are working at the same time on the same side of the body, this will save time and avoid much confusion and inconvenience. The procedure is as follows: Saw through the middle of the Clavicle, divide the Subclavius Muscle, and the Clavicular Attachment of the Trapezius. Tie two ligatures on the Axillary Vein and divide it between the ligatures. Do the same with the first part of the Axillary Artery.

Assemble the cords of the Brachial Plexus, surround them with a strong ligature and divide them above it. Divide the scapular attachments of the Omohyoid, upper portion of the Trapezius, and the Levator Anguli Scapulæ. Divide the Latissimus Dorsi just below its tendon, and both of the Rhomboidei, close to their spinal attachment. Study the Serratus Magnus (*m. serratus anterior*) carefully before dividing it about 2 inches from the spinal border of the scapula. Remove the ligature from the Axillary Vein, compress and rub upwards all the veins of the forearm and arm in order to completely express their contents. This will avoid much of the annoyance of soiling caused by leakage from cut veins. Thoroughly cleanse the forearm and hand by scraping away the epithelium, especially from the palmar surface of the hand and fingers. The finger-nails will usually come away quite readily, if not too dry. If so, remove them as well. The more thoroughly you clean the hand and fingers now, the easier your work will be when you dissect them later.

FOREARM, SUPERFICIAL DISSECTION. (See Fig. 7.)

Lay the arm on an "arm board" and securely fasten its upper end to the board. Make a short longitudinal incision in the middle of the back of the forearm. Cut cautiously just through the skin and no more. Slightly retract the skin on each side of the cut in order to make sure that you are through the skin only, and not through the superficial fascia as well. Then extend the incision to the full limit above, and extend it downwards to the middle of the back of the wrist. From this point make an incision down the middle of

the back of the thumb to the base of the nail. From the same starting-point make a similar incision on the back of each finger. Dissect the skin from the entire forearm all the way down to the level of the wrist, then cut it away, with scissors, about two fingers' breadth above the level of the wrist. When you come to dissecting the palm, you will realize the importance of leaving this skin-flap in front. Begin on the back of the hand and dissect off the skin laterally as far as the "hair line" on each side. The slips of skin on the back of the hand should now be dissected down as far as the webs of the fingers.

Pin the little finger down to the board, and dissect skin laterally, as far around on the ulnar side as you find it to be readily separable from the underlying fascia. Pin this skin-flap to the board.

On the palmar surface of the hand and fingers, the skin and the underlying fascia are so intimately adherent that they are very difficult to separate. So when you encounter this blending at the side of a finger, you will know that you are close to the palmar surface, and do not attempt to effect any further separation of the skin. Reflect the other half of the skin in the same manner and to the same limit. You will find it necessary to cut through the skin laterally at the base of the nail. Repeat this procedure with every one of the fingers and the thumb. These skin-flaps should now be trimmed away, carefully and neatly, with a pair of scissors.

Superficial Veins of the Forearm.—Trace the Cephalic Vein downwards from the arm, and follow out its

two main tributaries, namely, the Superficial Radial and the Median Cephalic.

Trace the Basilic Vein downwards from the arm, and follow out its three main tributaries, namely, the Posterior Superficial Ulnar, Anterior Superficial Ulnar, and Median Basilic.

From the juncture of the Median Cephalic Vein and the Median Basilic Vein trace downwards the Median Vein. All of the small tributary veins will have to be sacrificed, but the larger veins can be divided at a low level, reflected up out of the way, and restored later.

Cutaneous Nerves of the Forearm.—Pick up the Internal Cutaneous Nerve (*n. cutaneus antebrachii medialis*) in the arm and trace it downwards on the ulnar side of the front of the forearm to the wrist; then follow out the posterior branch of the Internal Cutaneous Nerve (*m. cutaneus antebrachii medialis*). Emerging from behind the outer border of the Biceps Muscle, just a short way above the bend of the elbow, look for the Cutaneous Branch of the Musculocutaneous Nerve. Follow its anterior branch downwards on the radial side of the front of the forearm, and then follow its posterior branch downwards on the radial side of the back of the forearm.

Look for the dorsal branch of the Ulnar Nerve. You should find it just below the lower end of the Ulna, where it crosses the tendon of the Extensor Carpi Ulnaris, superficially and almost at right angles to it. Trace out the branches of this nerve on the back of the hand.

On the radial side, about the middle of the lower

third of the forearm, look for the Radial Nerve (*ramus superficialis n. radialis*), where it pierces the deep fascia after having crossed backward over the tendon of the Extensor Carpi Radialis Brevior. Remove the fat over it by carefully scraping downwards, then there should be no difficulty about seeing the nerve.

Clean the Radial Nerve (*ramus superficialis n. radialis*) and trace out all of its branches except the Palmar Cutaneous.

BACK OF THE FOREARM AND HAND

Remove all fat and thoroughly clean the sheath of the forearm and the Posterior Annular Ligament. Incise the fascia covering the extensor tendons on the backs of the fingers, carefully expose these tendons from the lower border of the annular ligament to their insertions at the bases of the middle and distal phalanges. By making traction on the tendons below the annular ligament, identify the muscle above. Split the deep fascia covering each muscle on each side of the muscle. In this fashion identify and free the Extensor Communis Digitorum. Be careful not to split it up too much; assemble its tendons, and bind them together with a ligature. Divide the Annular Ligament over them.

Identify and free the Extensor Indicis and the Extensor Minimi Digiti. Expose the tendons on the back of the thumb from the annular ligament down to their terminations. Lift up the Extensor Communis Digitorum; under it, crossing the extensor muscles of the thumb, look for the Posterior Interosseous Branch of the Musculospiral Nerve (*n. radialis*),

FIG. 7.—BACK OF FOREARM AND HAND.

The knife incisions are indicated by continuous red lines. When it has been dissected free that far, the skin should be trimmed away, with scissors, along the dotted red lines.

and with it the Posterior Interosseous Artery (*a. interossea dorsalis*). Trace both of them upwards. Free and clean the Extensor Osis Metacarpi Pollicis (*m. abductor pollicis longus*), Extensor Brevis (*primi internodii*) Pollicis, and the Extensor Longus (*secundi internodii*) Pollicis. Clean the Anconeus Muscle, retract it upwards and outwards, and clean the Recurrent Branch of the Posterior Interosseous Artery. Clean the Supinator Brevis Muscle (*m. supinator*), but do not divide it.

Free the Brachioradialis (*supinator longus*), Extensor Carpi Radialis Longior, Extensor Carpi Radialis Brevior, and the Extensor Carpi Ulnaris. Trace out the Posterior Carpal Arch and Metacarpal Arteries.

Clean away all fat and carefully trim away all of the shreds of fascia from the back of the hand and fingers. Clean the Dorsalis Pollicis Artery and the Dorsalis Indicis Artery.

Carefully clean the extensor muscles and remove all fat and shreds of deep fascia that may have been left. The palm of the hand must be dissected before any attempt is made to dissect the front of the forearm.

PALM OF THE HAND, SUPERFICIAL DISSECTION

With the palmar surface uppermost, extend the fingers, spread them apart, and fasten them to the board. Absolutely avoid making any longitudinal incisions in the palm of the hand. In the middle of the palm of the hand the skin and the palmar fascia are so intimately blended and adherent, that a longitudinal incision through them would greatly increase the difficulty of separating them. In front of the lower

end of the forearm, in the midline, look for the Palmaris Longus Muscle.

Between the tendon of the Supinator Longus (*m. brachioradialis*) and the tendon of the Flexor Carpi Radialis, look for the Radial Artery; find its Superficialis Volæ Branch; keep it definitely in mind in order to avoid injuring it. Dissect the skin downwards, using as your guide the tendon of the Palmaris Longus. On the radial side of the tendon, look for the Palmar Cutaneous Branch of the Median Nerve, and to the ulnar side of the tendon, look for the Palmar Cutaneous Branch of the Ulnar Nerve. Both of these nerves cross the Anterior Annular Ligament superficially. Dissect the skin downwards over the annular ligament; follow the radiating fibers of the insertion of the Palmaris Longus; separate the skin from the palmar fascia and its digital slips, as far down as the webs of the fingers. In dissecting the skin from the Thenar Eminence, be careful not to cut the Superficialis Volæ Artery.

In removing the skin from the Hypothenar Eminence, do not at the same time remove any of the underlying, hard granular fat. Trim the skin away at the bases of the thumb and fingers, with a pair of scissors.

By pressing on the palmar fascia, you can usually cause much soft fat to well up between the digital slips. With a pair of scissors, "curved on the flat," carefully trim away as much of this fat as will readily protrude. Removal of this fat now, will make the later stages of the dissection very much easier to do. Make a midline incision down the entire length of the little finger. Cut deeply enough to expose the theca of the flexor

tendons and to divide the dense fibrous tissue that covers in the Digital Nerves and Arteries. Reflect this dense deep fascia and the skin, at the same time, toward the ulnar side. Embedded in the soft fat at the side of the finger, look for the Digital Nerve, free it, and trace it up to its origin from the Ulnar. At the side of the finger, lying behind the nerve, look for the Digital Artery and trace it upwards to its origin from the Superficial Palmar Arch. This nerve and artery, on the ulnar side of the little finger, are especially liable to be cut when the hypothenar fat is being removed; so it is important to trace them out fully before attempting to remove that fat.

Reflect the skin and deep fascia laterally from the other half of the little finger. You will find the nerve and artery in the same relative position on this side that they were on the other side. Trace both upwards to where they dip in between the digital slips of the palmar fascia. Dissect the other fingers in exactly the same way that you have used for the little finger. Then carefully and neatly trim away all of the lateral skin-flaps. Clean the Palmaris Brevis Muscle, reflect it toward the midline of the hand, but do not detach it from the palmar fascia. With flat curved scissors, carefully trim away all of the hard, granular hypothenar fat, clean the surface of the Hypothenar Muscles, but do not attempt to separate them at this time. Find the Superficialis Volæ Artery, above the wrist, and trace it downwards. If you find it piercing the Abductor Pollicis or passing under that muscle, cease following it for the time being. If it is superficial, follow it to its termination. Clean the surface of the

FIG. 3.—FRONT OF RIGHT FOREARM AND PALM OF HAND.

The only knife incisions to be made are indicated by continuous red lines. The red dotted lines indicate where the skin is to be trimmed away with scissors.

Thenar Muscles, but do not separate them in any way. Incise the palmar surface of the thumb in the same way that you did the fingers. Trace the nerves back to the palm of the hand and trace the arteries back to the Princeps Pollicis. Trim away the lateral skin-flaps.

Divide the Anterior Annular Ligament on the radial side of the tendon of the Palmaris Longus. Divide the digital slips and reflect the palmar fascia upwards. Clean the Superficial Palmar Arch (*arcus volaris superficialis*) and all of its branches. Lift up the Median Nerve and clean all of its branches.

Split open all of the sheaths of the flexor tendons, so that the tendons can be lifted up and the deep tendons separated from the superficial tendons. Defer the deep dissection of the hand until the front of the forearm has been dissected.

FRONT OF THE FOREARM, DEEP DISSECTION

The nerves and arteries are the structures most likely to be destroyed, therefore they should be carefully isolated before any attempt is made at cleaning the muscles. In order to allow ready access to the nerves and arteries, the muscles will have to be separated and thoroughly loosened up so that they can be lifted up and freely retracted. For this reason the hand should be dissected first, and the anterior annular ligament should be divided before attacking the deep structures in the front of the forearm.

Lift up the tendon of the Palmaris Longus; on each side of its muscular belly, split the Deep Fascia that constitutes the sheath of the forearm, and free the

muscle with your finger. Free the Flexor Carpi Ulnaris, Flexor Carpi Radialis, and the Brachioradialis. In each instance, lift up the tendon and free the muscle with your finger. Lastly, free the Pronator Radii Teres and trim away the Bicipital (Semi-lunar) Fascia.

It will be necessary to sacrifice the arteries that supply these muscles; so snip them off, close to the muscle they enter.

Thoroughly clean the Radial Artery and remove its Venæ Comites. Follow the Radial Recurrent Artery, along with the Musculospiral Nerve, upwards between the Brachioradialis Muscle and the Brachialis Anticus, to its anastomosis with the Superior Profunda Branch of the Brachial Artery.

Thoroughly clean the superficial layer of muscles, remove their sheaths, and all of the intermuscular areolar tissue and fat.

Clean the two heads of the Flexor Carpi Ulnaris; be careful of the Ulnar Nerve and Posterior Ulnar Recurrent Artery which pass through the interval. Clean the two heads of the Pronator Radii Teres and free the Median Nerve as it passes between them. Clean the middle and outer heads of the Flexor Sublimis Digitorum and carefully free the intervening border of the muscle. Clean the superficial surface of the Flexor Sublimis, assemble its tendons and tie them together, lift it up, and thoroughly free it with your finger from the underlying muscles. Do not divide the Flexor Sublimis in any way. It is only necessary to flex the fingers and wrist in order to relax it fully. Carefully preserve the arch formed by its upper border.

Retract the Flexor Sublimis toward the radial side. Clean the Ulnar Nerve and follow it up into the arm. Be careful, in the region of the elbow, not to cut the Posterior Ulnar Recurrent or Inferior Profunda (*a. collateralis ulnaris superior*) Arteries, which you will find with that part of the Ulnar Nerve.

Clean the Ulnar Artery and remove its Venæ Comites; the muscular branches will have to be sacrificed.

Antecubital Space.—Retract the Pronator Radii Teres downwards. Clean the Anterior Ulnar Recurrent Artery and follow it up to the Anastomotica Magna (*a. collateralis ulnaris inferior*). Clean the Common Interosseous Artery and the commencement of the Posterior Ulnar Recurrent Artery.

Clean the insertions of the Biceps and Brachialis Anticus (*m. brachialis*). Remove all of the débris and fat, and thoroughly clean up the Antecubital Space.

Reflect the Flexor Sublimis toward the radial side; finish cleaning the Posterior Ulnar Recurrent Artery and follow it upwards to its anastomosis with the Inferior Profunda (*a. collateralis ulnaris superior*). Finish cleaning the Median Nerve.

Assemble the tendons of the Flexor Profundus Digitorum, tie them together, and then clean that muscle and the Flexor Longus Pollicis.

Separate these two muscles, and clean the Anterior Interosseous Artery and the Anterior Interosseous Branch of the Median Nerve.

Clean the Pronator Quadratus Muscle and the Anterior Carpal Branches of the Radial and Ulnar Arteries.

THE HAND, DEEP DISSECTION

Pick up the tendons of the Flexor Profundus Digitorum and clean the Lumbricales Muscles.

Locate the base of the proximal phalanx of the little finger. On its ulnar side, you will find the insertion of two tendons. Lift both of these up together and separate their muscles from the underlying Opponens Minimi Digiti (*m. opponens digiti quinti*). Use your knife handle for doing this.

Now separate the two tendons from each other, and working upwards, separate the Abductor Minimi Digiti (*m. abductor digiti quinti*) from the underlying Flexor Brevis Minimi Digiti (*m. flexor digiti quinti brevis*). In the interval between them, look for the deep palmar branches of the Ulnar Artery and Ulnar Nerve.

The Thenar Muscles.—Separate the Abductor Pollicis from the underlying Opponens and Flexor Brevis. Be careful not to injure the Superficial Volar Artery.

Retract the Abductor Pollicis (*m. abductor pollicis brevis*) upwards; separate the Opponens (or Flexor Ossis Metacarpi) Pollicis from the Flexor Brevis Pollicis and free it thoroughly.

Locate the base of the proximal phalanx of the thumb. On its ulnar side, you will find the insertion of two flat tendons. The more superficial and anterior one of them, is the insertion of the inner head (Adductor Obliquus) of the Flexor Brevis. The deeper and more posterior insertion, is that of the Adductor (Adductor Transversus) Pollicis.

By separating their insertions, it becomes easy to separate the Adductor Pollicis from the Flexor Brevis. Separate the Adductor Pollicis from the Interosseous

Muscles behind it. The two heads of the Flexor Brevis are easily separated.

Clean the Princeps Pollicis Artery and the Radialis Indicis Artery.

Follow the Radial Artery, between the two heads of the First Dorsal Interosseous Muscle, into the palm of the hand, and clean the Deep Palmar Arch and its branches.

Remove all fat and clean the Interosseous Muscles.

LOWER EXTREMITY

ORDER OF DISSECTIONS

1. Gluteal Region.
2. Back of the Thigh.
3. Popliteal Space.
4. Back of the Leg.
5. Sole of the Foot.
6. Front of Thigh, superficial dissection.
7. Front and Inner Side of the Thigh, deep dissection.
8. Front of the Leg and Dorsum of Foot.

GLUTEAL REGION

Thoroughly clean the surface of this region and scrape away loose epithelium. Make an incision from the tip of the coccyx, downwards and outwards, to a point just below the attachment of the *Gluteus Maximus* (*m. glutæus maximus*) to the femur. Make a second incision from the tip of the coccyx, up the midline of the back, to a point on a level with the crest of the ilium, and from thence, laterally outwards, following the outline of the crest, to the anterior superior spine of the ilium. Begin at the middle of the sacrum and reflect the skin forwards and downwards without trying to remove much fat. Beginning at the same place, cautiously reflect the fatty layer of the superficial fascia in the same manner as the skin. As you advance, be on the watch for the cutaneous nerves, which you will find as follows:

Piercing the Deep Fascia, immediately above and in front of the iliac attachment of the *Gluteus Maximus*

(*m. glutæus maximus*), look for the Iliac Branch of the Iliohypogastric Nerve, it runs almost vertically downwards.

Piercing the Deep Fascia, slightly behind and lower than the Iliac, look for the Posterior Branches of the Lumbar Nerves, they run downwards and slightly outwards.

Piercing the Deep Fascia, close to the sacral origin of the Gluteus Maximus (*m. glutæus maximus*), look for the Posterior Branches of the Sacral Nerves. They are three in number, and run horizontally outwards.

Winding upwards from under the postero-inferior border of the Gluteus Maximus (*m. glutæus maximus*), look for the Perforating Cutaneous Branch of the Fourth Sacral Nerve. After perforating the Great Sacrosciatic Ligament (*l. sacrotuberosum*), it curls around the lower border of the Gluteus Maximus, and then runs almost vertically upwards.

Remove all of the fatty layer. Thoroughly clean the surface of the Gluteus Maximus (*m. glutæus maximus*) and remove its sheath. The easiest way of doing this is to use a pair of scissors ("curved on the flat"), and work from above and behind toward the femoral insertion. Be particularly careful to clearly define both borders of the Gluteus Maximus (*m. glutæus maximus*), especially the postero-inferior border. With your fingers, thoroughly free the Gluteus Maximus from the underlying structures, and then divide it, from before backwards, at the level of the top of the Great Trochanter of the Femur. Reflect the lower portion downwards. Note the bursa between it and the Great Trochanter.

FIG. 9.—GLUTEAL REGION, BACK OF THIGH, POPLITEAL SPACE, AND BACK OF LEG.

Continuous red lines indicate knife incisions. Dotted red lines show where the skin should be cut with scissors only.

Reflect the upper portion upwards. Note the bursa between it and the tuberosity of the ischium. Carefully detach the Gluteus from the Great Sacrosciatic Ligament. Be careful of the Perforating Cutaneous Nerve.

Entering the deep surface of the Gluteus Maximus (*m. glutæus maximus*) you will find the superficial branches of the Gluteal (*a. glutæa superior*) Branch of the Posterior Division of the Internal Iliac Artery, the Inferior Gluteal (*n. glutæus inferior*) Branch of the Sacral Plexus, and the Gluteal (*nn. clunium inferiores [laterales]*) Branches of the Small Sciatic (*n. cutaneus femoris posterior*) Nerve from the Sacral Plexus.

Carefully clean the surface of the Great Sacrosciatic Ligament (*l. sacrotuberosum*) and the deep surface of the Gluteus Maximus (*m. glutæus maximus*).

Carefully define the Great Sacrosciatic Foramen and isolate the structures that emerge from it, without trying as yet to clean them. You will find the Superficial Branch of the Gluteal Artery (*a. glutæa superior*) running upwards. Clean it.

Radiating forwards, and forwards and upwards, are the Deep Branches of the Gluteal Artery (*a. glutæa superior*) and the Superior Gluteal (*n. glutæus superior*) Branch of the Lumbosacral Cord.

Running directly downwards you will find the Great Sciatic (*n. ischiadicus*) Branch of the Sacral Plexus. To its inner side, and then crossing behind to gain its outer side, you will find the Small Sciatic (*n. cutaneus femoris posterior*) Branch of the Sacral Plexus, accompanied by the Sciatic Vessels (*vasa nervi comes ischiatici*). Using a pair of scissors ("curved on the flat"), carefully trim away all of the fat and areolar tissue; thoroughly

clean the Gluteus Medius (*m. glutæus medius*) and remove its sheath.

In freeing the anterior border of the Gluteus Medius (*m. glutæus medius*), split the Deep Fascia along the posterior border of the Tensor Vaginæ (Fascia) Femoris, but be careful not to divide the nerve to the Tensor as it emerges from under the Gluteus Medius. Free the Gluteus Medius, divide it close to its insertion, and reflect it upwards. Entering its deep surface, you will find the branches of the Superior Gluteal Nerve (from the Lumbosacral Cord) and Deep Branches of the Gluteal Artery (Branch of the Posterior Division of the Internal Iliac), the main trunks of which emerge from between the Piriformis and Gluteus Minimus, and lie on the surface of the Gluteus Minimus. First clean the nerve and artery, then the deep surface of the Gluteus Medius, the Gluteus Minimus, and the Piriformis. Carefully free the Piriformis from the Gluteus Minimus and the Gemellus Superior. Frequently the peroneal portion of the Great Sciatic Nerve (*n. ischiadicus*) pierces the Piriformis, while the tibial portion emerges separately from underneath the Piriformis. Emerging from between the Piriformis and the Gemellus Superior are the following structures, which should be cleaned in the order given:

Inferior Gluteal Nerve (branch of Sacral Plexus); Sciatic Artery (Branch of the Anterior Division of the Internal Iliac); Small Sciatic Nerve (from Sacral Plexus). You will find its Long Pudendal Branch running inwards across the back of the Hamstring Muscles just below their origin from the Tuberosity of the Ischium; the Great Sciatic Nerve (*n. ischiadicus*);

lastly, crossing the Spine of the Ischium and Lesser Sacrosciatic Ligament (*l. sacrospinosum*), you will find in the following order, from within outwards; the Pudic Nerve (*n. pudendalis*) from Sacral Plexus, the Internal Pudic (*a. pudenda internis*) Branch of the Anterior Division of the Internal Iliac Artery, and the nerve to the Obturator Internus (from the Sacral Plexus).

Clean merely the exposed portions of the Pudic Nerve and Artery and the nerve to the Obturator Internus, and be sure not to cut the Great Sacrosciatic Ligament (*l. sacrotuberosum*) for any purpose whatever. Clean and separate from each other the Gamellus Superior, Obturator Internus, Gamellus Inferior, and the Quadratus Femoris.

BACK OF THIGH

Make an incision down the middle of the back of the thigh to a point a hand's breadth below the bend of the knee. From this incision reflect the skin laterally, on the outer side, as far as the Tensor Vaginæ Femoris, and on the inner side, as far as the Gracilis. At the lower end of the incision, cut the skin laterally with scissors. Do not make any knife-incisions around the leg. Pick up the Small Sciatic Nerve (*n. cutaneus femoris posterior*), split the overlying fascia with a pair of blunt-pointed scissors; follow this nerve downwards and trace out each of its lateral branches as you come to it.

Now reflect the fascia and overlying fat laterally, as far as the reflection of the skin, and trim it away. Free the lower border of the Quadratus Femoris from

the Adductor Magnus. Emerging from between them, you will find the Internal Circumflex (*a. circumflexa femoris medialis*) Branch of the Profunda Femoris Artery. Thoroughly free the Quadratus Femoris, with your finger, from the underlying structures, and rotate the Femur outward in order to relax it.

Clean the Internal Circumflex Artery (*a. circumflexa femoris medialis*), trace its transverse branch outwards to where it anastomoses with the terminal branches of the External Circumflex, on the outer side of the Great Trochanter of the Femur. It is joined from above by the Sciatic Artery, and from below by the Superior Perforating Branch of the Profunda Femoris, forming what is known as the Crucial Anastomosis. Retract the Quadratus Femoris and clean the underlying tendon of the Obturator Externus, the upper border of the Adductor Magnus Muscle, and the deep surface of the Quadratus. Opposite the insertion of the Gluteus Maximus, look for the Superior Perforating Artery (*a. perforans prima*), as it pierces the Adductor Magnus close to its femoral attachment.

Clean this artery and trace it upwards to the Crucial Anastomosis. Thoroughly free and clean the Long Head of the Biceps, the Semitendinosus, and the Semimembranosus Muscles. Clean the main trunk of the Great Sciatic Nerve. Pull the Long Head of the Biceps aside and look for the lower three Perforating (*aa. perforantes*) Branches of the Profunda Femoris. They pierce the Adductor Magnus close to its femoral attachment opposite the origin of the Short Head of the Biceps.

Be especially careful of the lowermost one, the Inferior Perforating, but do not attempt to follow it out until you dissect the Popliteal Space.

Clean both sides of the Short Head of the Biceps and the entire posterior surface of the Adductor Magnus. Thoroughly remove all areolar tissue and fat.

POPLITEAL SPACE

Make an incision down the middle of the back of the leg to the point of the heel. From this incision reflect the skin laterally far enough to fully expose the back of the leg. On the outer side of the Tendo Achillis, look for the External (or Short) Saphenous Vein, accompanied along its outer side by the External (or Short) Saphenous Nerve. Follow the vein upwards to where it pierces the Deep Fascia to enter the Popliteal Space, split the fascia over it with blunt-pointed scissors, and follow it to the Popliteal Vein. As you trace the external Saphenous Nerve upwards you will find that it arises from two heads. The inner head (Communicans Tibialis) will lead to the Internal Popliteal Nerve. The outer head is the Communicans Fibularis (or Peronei). After piercing the Deep Fascia below and further out than does the inner head, it leads to the External Popliteal (or Peroneal) Nerve.

Trace the Communicans Fibularis upwards to the External Popliteal Nerve; then trace it downwards through the Deep Fascia on to the outer side of the back of the leg. Clean the surface of both of the heads of the Gastrocnemius Muscle, but do not divide either of them, and be careful not to tear them apart where they join together to form the main muscle. Free with

your finger the tendons of the Hamstring Muscles. Just above the origin of each of the heads of the Gastrocnemius from the condyles of the femur, feel in the loose areolar tissue and fat for the Superior Articular Arteries, tear the areolar tissue away with your forceps and expose these arteries, but do not attempt to work them out as yet.

Using your fingers, free the heads of the Gastrocnemius from the underlying structures, but be careful not to tear in two the Sural Artery which enters the deep surface of each. Free the Plantaris Muscle and then free the united portion of the Gastrocnemius from the Soleus. Isolate the Tendon of the Plantaris.

Divide the Gastrocnemius well below the union of its two heads in order to preserve the arch they form. Be careful not to divide the Tendon of the Plantaris. Reflect the Gastrocnemius upwards and isolate the Sural Artery and the muscular branch of the Internal Popliteal Nerve, which you will find entering the deep surface of each head. On the back of the inner tuberosity of the tibia, feel for the Inferior Internal Articular Artery. It runs inwards and downwards from the midline of the back of the knee. Isolate it, but do not yet attempt to trace it out. On the back of the outer tuberosity of the tibia, just above the head of the fibula, look for the External Inferior Articular Artery. Expose it without tracing it out. Clean and clearly define the arch formed by the upper border of the Soleus Muscle, and free it with your finger from the underlying structures. Isolate the Internal Popliteal Nerve and its branches in the Popliteal Space

and clean it as far as the arch formed by the upper border of the Soleus. In the same way clean the Popliteal Vein. Clean the External Popliteal Nerve and follow it outwards to where it passes under the Tendon of the Biceps. Clean the Plantaris Muscle. Remove the Sheath of the Popliteal Artery. Clean the Superior Internal Articular Artery and follow it to where it passes under the Tendon of the Adductor Magnus. Clean the Internal Sural Artery and the Inferior Internal Articular Artery. Clean the Superior External Articular Artery and follow it to where it passes under the Tendon of the Biceps. Clean the Azygos Articular, External Sural, and Inferior External Articular Arteries.

Thoroughly remove all of the areolar tissue and fat from the Popliteal Space, scrape it away from the back surface of the Femur. Clean the Biceps Tendon and the External Lateral Ligament of the knee. Clean the surface of the Posterior Ligament of the Knee, especially the portion that runs from the outer condyle obliquely downwards and inwards to the Inner Tuberosity of the Tibia (Winslow's Ligament). Clean the Tendon of the Semimembranosus and trace its continuation into Winslow's Ligament. Clean the exposed surface of the Popliteus Muscle and remove the fat from the Arch of the Soleus.

BACK OF LEG, DEEP DISSECTION

It is not necessary to have the body in a prone position. By flexing the knee and rotating the thigh this region can be got at very readily.

Clean the lower portion of the Gastrocnemius, the

Tendo Achillis, and the Tendon of the Plantaris. Reflect the lower portion of the Gastrocnemius downwards. Clean its deep surface and the superficial surface of the Soleus. Free with your finger the Tendo Achillis and the lower part of the Soleus from the underlying structures. Do not divide the Soleus, but, beginning from below, detach it from the Tibia all the way up, except the uppermost portion, which should be retained in order to preserve the aponeurotic arch of the upper border of the Soleus. In the same way detach the lower part of the Soleus from the Shaft of the Fibula, but do not divide it anywhere. Reflect the Soleus outwards and remove the underlying deep fascia.

Clean the Posterior Tibial Nerve and Posterior Tibial Artery. Some of the small muscular branches of the artery will have to be cut. Finish the cleaning of the Popliteus Muscle. Retract the Soleus inwards. Clean the commencement of the Anterior Tibial Artery and the commencement of the Peroneal Artery. Remove the Deep Fascia overlying the Flexor Longus Hallucis. Clean the Peroneus Longus and the surface of the Flexor Longus Hallucis. Retract the Soleus outwards, free the inner border of the Flexor Longus Hallucis, lift it up and finish cleaning the Peroneal Artery.

Clean the surface of the Flexor Longus Digitorum, free it from the underlying Tibialis Posticus, retract it inwards and clean its deep surface and the surface of the Tibialis Posticus.

Incise the skin and reflect it forwards far enough to expose the inner side of the ankle.

Carefully clean the Internal Annular Ligament behind the Internal Malleolus.

Remove all of the fat from under the Tendo Achillis. Note the bursa between it and the Calcaneum.

THE SOLE OF THE FOOT

While it is not absolutely necessary to have the body in a prone position, the sole of the foot is far easier to dissect when the heel is uppermost. The foot and toes should be thoroughly cleaned by scraping away the epithelium from the plantar surface especially, and the toe-nails should be removed if they are loose.

Pinch up the pad on the plantar surface of the heel in order to acquaint yourself with its thickness. By doing so you can readily determine the level at which your incision should be made, in order to completely remove the pad from the calcaneum. Commence your skin incision on the side of the base of the little toe, carry it backwards along the outer side of the foot, then around the back of the heel, then along the inner side of the foot, following the contour of the instep, then over the side of the ball of the great toe as far as the plantar crease of the toes. Longitudinal incisions in the sole of the foot should be avoided absolutely.

Nor should the skin ever be cut transversely except with scissors, and then, only at the level of the web of the toes after it has been dissected forwards to that point. It is a great disadvantage to attempt dissecting the skin towards the heel. Any knife incision in the sole of the foot, not only endangers important structures, but is very likely to more than double the difficulty of subsequent dissection. Begin in the incision

FIG. 10.—SOLE OF THE FOOT.

The knife incisions are indicated by continuous red lines. After it has been dissected up that far, the skin should be trimmed, with scissors, along the dotted red lines.

on the back of the heel and cut forwards boldly to the bone; then continue forwards along the plantar surface of the calcaneum until you encounter the bursa. The bursa can be readily recognized by its glistening surface. Follow this surface forwards and it will lead to the Plantar Fascia (*aponeurosis plantaris*). Follow the plane of the Plantar Fascia forwards until you encounter its digital slips. Keep superficial to these digital slips and follow each of them all the way to the web of the toes. Trim away this flap with a pair of scissors. If you have been careful to always keep superficial to the Plantar Fascia and its digital productions, this plantar flap will consist merely of skin and fat, and cannot possibly contain any important structure.

Thoroughly clean the exposed surface of the Plantar Fascia (*aponeurosis plantaris*). Much soft fat will now protrude between the digital slips of the Plantar Fascia. Trim this away with a pair of scissors "curved on the flat." Press on the digital slips with the convex side of the open scissors, and cut away as much of this fat as can readily be made to protrude. Since the digital vessels and nerves lie too deeply to be in any danger of injury, removal of this fat in this manner will much diminish the difficulty of the subsequent dissection.

Each toe must now be dissected in the following manner: Make a deep midline incision the entire length of the plantar surface of each toe. By making the incision deep enough to expose the Sheath (Theca) of the Flexor Tendons, the Ligamentum Vaginale of the Theca will be divided, and the arteries and nerves

will be made readily accessible. Do not attempt to separate the skin from the underlying fascia, but reflect both together laterally on both sides.

Clean the collateral Digital Nerves (*nn. digitalis plantares proprii*) and trace them backwards to where they disappear under the digital slips of the Plantar Fascia; then, in the same way, clean and trace backwards the collateral Digital Arteries (*aa. digitales plantares proprii*). The nerves are superficial to the arteries. With scissors, neatly trim away the skin-flaps from along the sides of the toes and from the web of the toes, including all of the dense fascia and fat.

It is imperative that all five toes be dissected before proceeding with the dissection of the sole.

On the inner or mesial side of each of the smaller toes is a Lumbrical Muscle. All four of these should now be cleaned. Split open the Theca of the Flexor Tendons in the midline of each of the toes, thoroughly free the tendons, but do not sever any of them. Divide all of the digital slips of the Plantar Fascia (*aponeurosis plantaris*) and reflect it backwards as far as its attachment to the Calcaneum, but do not detach it.

Clean as much as is now exposed of the Plantar Digital Arteries (*aa. metatarsales plantares*) and the Plantar Digital Nerves (*nn. digitales plantares communes*). This will bring you to the Internal Plantar Artery (*a. plantaris medialis*) and the Internal Plantar Nerve (*n. plantaris medialis*), as they emerge from between the Abductor Hallucis and the Flexor Brevis Digitorum. Also it will lead to the External Plantar Artery (*a. plantaris lateralis*) and the External Plantar

Nerve (*n. plantaris lateralis*), lying between the Flexor Brevis Digitorum and the Abductor Minimi Digiti (*m. abductor digiti quinti*).

Clean the Abductor Muscle of the little toe, beginning at its tendon and working backwards to its origin. Thoroughly free it from the underlying structures and from the Flexor Brevis Digitorum. In the same way clean and free the Abductor Hallucis and, lastly, the Flexor Brevis Digitorum. Lift up all three of these muscles and see to it that they are quite free all the way to their origin. Introduce a saw between them and the underlying structures, and then, by sawing horizontally backwards, cut loose that part of the Calcaneum to which they are attached.

Turn this flap downwards toward the toes and clean its deep surface. Clean as much as is now readily accessible of the Plantar Arteries and Nerves and their branches. Lift up and free the tendon of the Flexor Longus Hallucis, but be careful not to sever its tendinous communication with the Flexor Longus Digitorum. Clean first the inner head of the Flexor Accessorius (*m. quadratus plantare*), then its outer head. Lift it up and retract it inwards and clean the Flexor Brevis Minimi Digiti (*m. flexor digiti quinti brevis*), working from its insertion backwards. Clean and separate the two heads of the Flexor Brevis Hallucis, working from its two tendons backwards. Note the Sesamoid Bone in each.

Clean the Adductor Hallucis (*caput obliquum m. adductoris hallucis*), lift it up, and trace the deep branches of the External Plantar Nerve and Artery as they pass under its cover. Clean the Transversus

Pedis Muscle (*caput transversum m. adductor hallucis*) as it crosses the bases of the middle three toes. Divide the common tendon of the Flexor Longus Digitorum just above its division into the Digital Tendons, but below the insertion of the Accessorius; reflect the digital portion downwards and clean the Interosseous Muscles.

FRONT OF THIGH, SUPERFICIAL DISSECTION

If the back of the thigh has already been dissected, it will not be necessary to make any incisions. Otherwise, make an incision from the anterior superior spine of the ilium, down the outer side of the thigh, to a point about a hand's breadth below the bend of the knee. Make a corresponding incision down the inner side of the thigh, from the Spine of the Pubes to a point on the inner side of the leg, a hand's breadth below the bend of the knee. Do not make any knife incision along the line of Poupart's (Inguinal) Ligament. Begin at the upper and outer part and reflect the skin inwards, cutting along Poupart's Ligament with a pair of blunt-pointed scissors.

If the back part of the thigh has already been dissected, cut the skin with scissors along the Genito-femoral Crease. Reflect the skin downwards, to well below the knee, and trim it around the leg with scissors. Do not encircle the leg with any knife incisions. Transverse knife incisions are unnecessary as well as dangerous.

Carefully clean the Long (Internal) Saphenous Vein; follow it upwards to where it pierces the Deep Fascia (*fascia lata*). At this point lift it up and carefully

free it from the lower margin of the saphenous opening in the fascia lata, then free it the rest of the way around. Begin at the lower margin of the saphenous opening and clean the inner margin; then, beginning at the lower margin, clean the outer margin. Note that while they are continuous at the lower margin, the lateral margins of the saphenous opening are not continuous above, but that the outer margin overlaps the inner one.

Carefully preserve the saphenous opening. Do not detach the Fascia Lata immediately above it, from Poupart's Ligament. Incise the Fascia Lata along the anterior border of the upper part of the Tensor Vaginæ Femoris; carefully free it from the underlying structures, working from below upwards, to the anterior superior spine of the ilium. From this point detach it from the outer third of Poupart's Ligament and reflect it downwards for an inch or thereabouts.

Emerging from under Poupart's Ligament and then crossing the origin of the Sartorius immediately below the Anterior Superior Spine, look for the External Cutaneous Branch of the Lumbar Plexus. Trace it downwards and follow its anterior division through its canal in the Fascia Lata, and down the outer part of the front of the thigh. Just to the outer side of the Femoral Artery, look for the Anterior Crural Nerve; free the main trunk and trace its cutaneous branches downwards through the Fascia Lata and down the front of the thigh. The Middle Cutaneous Branch usually pierces the Sartorius Muscle before piercing the Fascia Lata, so do not mistake it for a muscular nerve.

The Crural Branch of the Genitocrural Nerve (from

FIG. 11.—GENITALIA, FRONT OF THIGH, FRONT OF LEG, AND DORSUM OF FOOT.

Continuous red lines indicate knife incisions. The skin should be cut along the dotted red lines with scissors only.

Lumbar Plexus) enters the thigh in the Sheath of the Femoral Artery, which it pierces first before piercing the Fascia Lata. By cautiously separating the Fascia Lata from the sheath of the femoral vessels you can see the Genitocrural Nerve as it bridges across to pierce the Fascia Lata. It is then easy to trace it out. Now that the Saphenous Vein and the Cutaneous Nerves are safe from injury, remove all of the overlying fat and thoroughly scrape and clean the Fascia Lata.

DEEP DISSECTION OF THE FRONT AND INNER SIDE OF THE THIGH

Incise the Fascia Lata downwards along the anterior border of the Tensor Vaginæ Femoris and the Iliotibial Band. Trim it along Poupart's Ligament almost as far as the Saphenous Opening. Be careful not to cut the Superficial Epigastric Artery; then downwards around the Saphenous Opening and up to Poupart's Ligament; then reflect it downwards and remove it entirely from the front of the thigh. Thoroughly free the Sartorius Muscle, throughout its entire length from origin to insertion, and thoroughly clean it. Free the Tensor Vaginæ (*fasciæ*) Femoris and the Iliotibial Band (*tractus iliotibialis*) and trim away the Fascia Lata from their posterior border. Free the Rectus Femoris Muscle from the underlying structures. Free the lower part of the Adductor Magnus from the Vastus Internus (Medialis) in order to expose the roof of Hunter's (Adductor) Canal.

Clean the Anterior Crural (Femoral) Nerve and trace out each of its branches to its termination. In

tracing the Saphenous Nerve, follow it downwards into Hunter's Canal (Adductor Canal); lay open the upper part of the roof of the canal, saving only the part in front of the opening in the Adductor Magnus; follow the Patellar Branch (*ramus infrapatellaris*) to where it pierces the Sartorius, and the main trunk of the Internal Saphenous downwards under the Tendon of the Sartorius. Be careful not to injure the Anastomotica Magna Artery (*arteria genu suprema*). The other branches of the Anterior Crural (Femoral) Nerve present no difficulties, but unless they are all traced out so that they can be retracted freely, the dissection of Scarpa's Triangle (Femoral Trigone) will be very difficult.

Open the sheath of the Common Femoral Artery, split it with scissors, working cautiously upwards until you encounter the Superficial Epigastric Artery branching upwards; then trim the sheath around the Epigastric and widely open it by transverse cuts. Using your forceps, free the outer part of the sheath from the outer side of the artery, working from above downwards. In this way it will be possible to see the collateral branches long before they are in danger of being divided. When you encounter a branch, cut the sheath transversely to the base of the branch and trim it away from around it; continue stripping the sheath away until you are again obstructed by a branch, and deal with it in the manner given. When you are cleaning an artery, always remove all *Venæ Comites*. Never use a knife in removing the sheath of an artery; use only forceps, a blunt-pointed probe, and blunt-pointed scissors.

Remove the sheath of the Superficial Femoral Artery, following it all the way to the opening in the Adductor Magnus. Be careful not to divide the Anastomotica Magna (*arteria genu suprema*), and in Hunter's (Femoral) Canal, be careful not to tear the Femoral Vein, which usually is quite adherent there. Defer working out the branches of the Profunda until later.

Trace out the Superficial Circumflex Iliac, Superficial and Deep External Pudendal Arteries.

Free and clean the Femoral Vein. It will be necessary to tie and cut off most of its branches. It is only important to save the Great Saphenous and the Femoral Veins in the thigh. Flex the thigh in order to relax the anterior muscles. Retract the Rectus Femoris Muscle out of the way and clean the commencement of the Deep (Profunda) Femoral Artery and its External (Lateral) Circumflex branch. Clean the direct head of the Rectus, retract the Tensor Vaginæ (*fasciæ*) Femoris outwards, clean the reflected head of the Rectus, and remove the fat from the front of the capsule of the hip-joint.

Free the Gracilis and Adductor Longus and clean them thoroughly throughout their entire length. Retract the Adductor Longus inwards; look for the Obturator Nerve on the front of the Adductor Brevis. Clean the Obturator Nerve and trace out its anterior and posterior divisions. Finish cleaning the Profunda Artery, and trace each of its perforating branches to where they pierce the Adductor Magnus.

Free the Pectineus, Psoas, and Iliacus Muscles from each other and from the underlying structures, but on no account should any one of them be cut.

Clean the Internal (Medial) Circumflex Artery, and follow it in between the Pectineus and Psoas.

Flex and slightly adduct the thigh, lift up the Adductor Longus, and free the Adductor Brevis.

Retract the Pectineus outwards; free the upper border of the Adductor Magnus, expose the Obturator Externus Muscle and the Obturator Artery. Unless these structures have already been partly cleaned in the dissection of the Gluteal Region, it would be better to defer cleaning them until they can be got at from behind as well as from in front.

Trace out the Anastomotica Magna (*arteria genu suprema*): Finish cleaning the Quadriceps Femoris, but do not try to separate the Crureus (*vastus intermedius*) from the Vastus Internus (*medialis*).

FRONT OF THE LEG AND DORSUM OF FOOT

First thoroughly clean the surface of the leg and scrape away as much of the epithelium as will readily come away. Remove the toe-nails if they are loose, and thoroughly scrape away the epithelium from the plantar surface of the foot and the toes.

Neglect in this respect, will cause much annoyance and delay. If the back of the leg has already been dissected, but the sole of the foot has not, it will only be necessary to incise the skin along each side of the foot, from the point of the heel to the plantar crease of the toes. Otherwise, make an incision down the front of the leg, following the line of the crest of the tibia down to the interval between the great toe and index-toe. Do not make any transverse knife incisions anywhere. Remove the skin from the front of the leg and the

dorsum of the foot as far down as the bases of the toes, at which level, trim it away transversely with scissors. Incise the skin along the midline of the back of each toe, reflect it laterally from each toe, and from the web between the toes as far as the plantar surface; then trim it away neatly from the sides of the toes, leaving only plantar skin on the foot and toes. Before attempting to remove any of the superficial fat, the veins and cutaneous nerves should first be worked out. Follow the Long or Internal Saphenous Vein (*v. saphena magna*) downwards on to the dorsum of the foot. Its collateral tributaries will have to be tied and divided. Look for the Long or Internal Saphenous Nerve (*n. saphenus*) as it emerges behind from between the tendon of the Sartorius and the tendon of the Gracilis; follow its Posterior Branch (*n. cutanei cruris medialis*) as it pierces the Deep Fascia and becomes cutaneous, and trace it downwards to its termination. Look on the front of the Anterior Annular Ligament (*l. trans versum cruris*) for one of the branches of the Musculocutaneous Nerve (*n. peronæus superficialis*).

Pick up the first one you come across and trace it upwards until you encounter the main trunk. Trace the main nerve-trunk upwards to where it emerges from the Deep Fascia, then trace it and its branches downwards as far as the middle phalanges of the toes. It is highly important to clean and thoroughly free all of the branches of this nerve, otherwise it would be impossible to properly dissect the dorsum of the foot. Now that all of the important superficial structures have been isolated, clean away all fat. Divide the

FIG. 12.—FRONT OF LEG AND DORSUM OF THE FOOT.

The knife incisions are indicated by continuous red lines. After it has been dissected away that far, the skin should be trimmed, with scissors, along the dotted red lines.

Anterior Annular Ligament (*l. transversum cruris*) close to its tibial attachment, and reflect it outwards, opening its compartments as you go.

Pick up the common tendon of the Extensor Longus Digitorum (*m. extensor digitorum longus*), which is the third one outward from the tibia; free each of its digital tendons all the way down to the bases of the middle and distal phalanges. By beginning at their tendons and working upwards, free, in the following order, the Tibialis Anticus (*m. tibialis anterior*), Extensor Longus Digitorum (*m. extensor digitorum longus*), the three Peroneal Muscles (*mm. peronæi*), and the Extensor Proprius Hallucis (*m. extensor hallucis longus*).

Clean the Anterior Tibial Artery (*a. tibialis anterior*), Anterior Tibial Recurrent (*a. recurrens tibialis anterior*), Internal Malleolar (*a. malleolaris anterior medialis*), and the External Malleolar (*a. malleolaris anterior lateralis*) Arteries.

Clean the Anterior Tibial Nerve (*n. peronæus profundus*) and the Anterior Peroneal Artery (*a. ramus peronæi perforans*).

Clean the anterior muscles of the leg and remove their sheaths. Clean and thoroughly free the Extensor Brevis Digitorum Muscle (*m. extensor digitorum brevis*) so that it can be readily lifted up or retracted. Clean the Dorsalis Pedis Artery, lift up the Extensor Brevis Digitorum, and clean Tarsal Artery (*a. tarsea lateralis*), the Metatarsal Artery (*a. arcuata*), the Dorsal Interosseous Arteries (*aa. metatarsæ dorsales*), and the outer branch of the Anterior Tibial Nerve (*n. peronæus profundus*).

Carefully scrape away and remove all overlying fat and expose the Dorsal Interosseous Muscles (*mm. interossei dorsales*). Clean the Internal Lateral Ligament (*l. calcaneotibiale*) and the External Lateral Ligaments (*ll. talofibularia et calcaneofibulare*) of the Ankle-joint (*articulatio talocruralis*).

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